

WHO CHRONICLE

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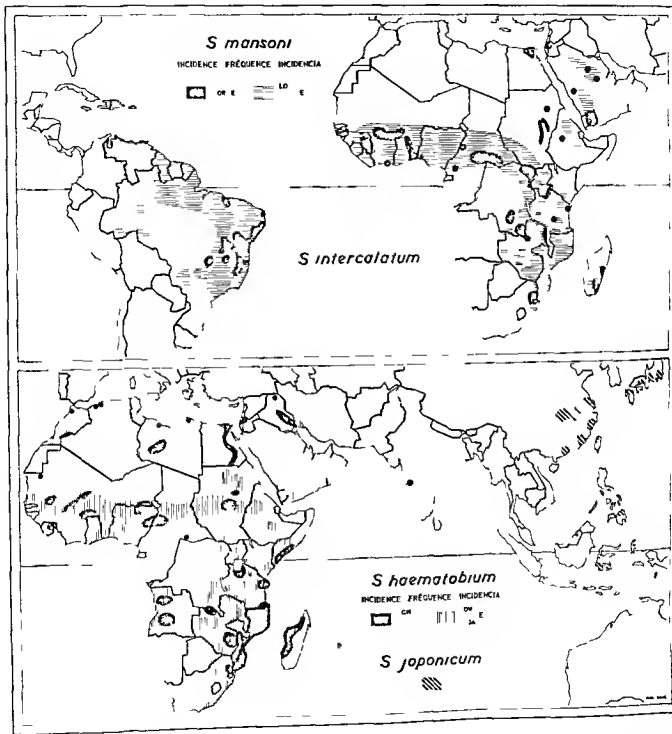
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WORLD HEALTH ORGANIZATION

WORLD DISTRIBUTION OF BILHARZIASIS



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NATURE AND EXTENT OF THE PROBLEM OF BILHARZIASIS

Introduction

For thousands of years a chronic endemic disease characterized by blood in the urine and by various bladder troubles has been known to exist in Egypt and elsewhere. The eggs of the parasite which causes the disease have been discovered in the kidneys of mummies of the Twentieth Dynasty (1250-1000 B.C.) and a clinical account of what appears to be the disease has been found in a papyrus. Its symptoms have been described in Babylonian inscriptions and in mediaeval medical literature. It was only in 1851 however that Bilharz then an assistant Professor at the Cairo School of Medicine found the causative agent in the mesenteric vein during a post mortem examination and identified it as a fluke. This parasitic worm bears the generic name of *Schistosoma* and the disease it causes in man is called bilharziasis.

The pathology of the disease was largely elucidated in the nineteenth century but it

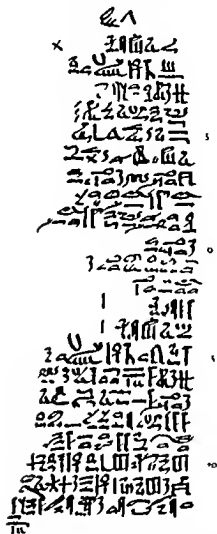
was not until the twentieth that the life cycle of the parasite was traced although both Harley and Cobbold had expressed the view in 1864 that a mollusc was the intermediate host.¹ In 1902 Manson postulated the existence of a second species of *Schistosoma* and when this was later conclusively demonstrated it was called *S. mansoni* after him. Yet a third species causing disease in man was identified in Japan and called *S. japonicum* Fujinuma and Nakamura identified the intermediate host of *S. japonicum* in the years 1907-1910 and in 1915 Leiper identified the intermediate hosts of *S. haematobium* and *S. mansoni* in Egypt. In 1923 Miyai and Suzuki succeeded in infecting snails with the miracidia the free living larvae hatched from the eggs of the parasite and in the same year Leiper and Atkinson traced the further development of the parasite in the liver of infected snails and demonstrated the penetration of the skin of mice by the immature forms escaping from the snails and their growth to maturity in the mesenteric veins of mice or hamsters. In 1925 Leiper observed the development of miracidia of *S. haematobium* in the fresh water snail *Bulinus* and in 1926 that of miracidia of *S. mansoni* in another genus. He also demonstrated that the immature forms leaving the snails in each case differed in their minute anatomy so that the species were different.

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¹ Harley J (1864) *At d-chu T ans* 47 55 Cobbold T S
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Further investigations have shown that other schistosomes can cause disease and that each species consists of various strains



A portion of the Papyrus Ebers an Egyptian papyrus of about 1500 B C in the US Library of Congress. It contains a remedy "to kill worms in the body that have been caused by the AAA disease" which is thought by some authorities to be bilharziasis

Essentially however the most important in human disease are the three already mentioned *S haematobium* the main cause of the urinary type of bilharziasis and *S mansoni* and *S japonicum* the main causes of the intestinal type of the disease

Distribution and importance

It is estimated that some 150 million human beings throughout the world suffer at present from bilharziasis the disease being widely distributed through Africa the Eastern Mediterranean China Japan the Philippines the Celebes and parts of South America. Some approximate figures collected by various experts are given in the accompanying table. A full survey of the extent of the disease has not yet been made. The methods of investigation ordinarily used in the surveys that have been carried out only give minimum figures for repeated examination of subjects previously diagnosed as negative brings the total number of identified cases up to a figure considerably higher than the original. Moreover it is difficult to isolate the part played by bilharziasis alone in the morbidity of a population which suffers from other parasites and infections concurrently as well as from nutritional deficiencies. Because of its wide distribution and the large number of people affected bilharziasis is now beginning to be recognized as second only to malaria in importance as a parasitic disease. It presents one of the major public health problems still to be solved in many tropical and sub-tropical regions.

Normally bilharziasis neither kills nor incapacitates completely although post mortem study leads to the conclusion that the damage it does to the bladder intestines liver lungs and other organs far exceeds what would be suspected on clinical and parasitological grounds. But even when it is not associated with other infections as it often is it affects the physical and mental development of children and greatly diminishes the strength and productive power of adults gradually sapping their resistance and making them easy prey for other infections. In some areas the impaired productivity of infected individuals is not obvious because they unconsciously adapt their working output to their reduced strength so that the damage done by the disease is disguised until they are required to put out more physical effort as they did during the war or do in the execution of public works or

ESTIMATED DISTRIBUTION OF BILHARZIASIS IN VARIOUS PARTS OF THE WORLD

	Populations affected	Author's
Egypt	2 000 000— <i>S. haematobium</i> <i>S. matsoi</i>	N. Ay d
West d C t l Al (l d g B i g Co g l)	7 000 000— <i>S. haematobium</i>	J. Ga d b
West Africa	1 350 000— <i>S. matsoi</i>	J. Ga d b
M d gasc	100 000— <i>S. h. matsoi</i> 700 000— <i>S. matsoi</i>	J. Ga d
S d —Ge ra	200 000— <i>S. haematobium</i>	N. Ay d
Belg C d	222 000— <i>S. matsoi</i>	J. Ga b
Ch	32 777 000— <i>S. japonicum</i>	W. Wright d
J	174 000— <i>S. japonicum</i>	G. W. H. nt d
Philipp	750 000— <i>S. japonicum</i>	T. P. Ig d
Bra l	4 000 000— <i>S. matsoi</i>	N. l. Dept. F. H. th
Ve l	0 000— <i>S. matsoi</i>	J. Jovh

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d B // Wld Hlth Org 1950 2, 581
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irrigation projects. The state of balance often achieved between the parasite and the human host then breaks down and subjective as well as objective symptoms of bilharziasis suddenly appear. This state of balance is another of the reasons why the true extent of the disease is still only approximately known. In the case of *S. haematobium* for example, some degree of haematuria and bladder or kidney pain is so common in endemic areas that it is regarded as normal and no one thinks of going for treatment or even of reporting such everyday symptoms to a doctor. In one section of the European population of southern Africa indeed haematuria in boys has been regarded as a normal condition associated with puberty.*

Attempts have been made to estimate the economic loss due to bilharziasis in certain areas. The WHO Leyte bilharziasis project in the Philippines* calculated the annual loss for 125 000 infected persons at \$1 350 000 (the minimum daily wage in this country

being \$2.00). The total medical expenditure worked out for 100 000 persons who showed definite symptoms was \$5 282 500. In Japan the economic loss plus the cost of treatment for an area of 90 square miles was reckoned at \$3 million per year and the loss for the Isle of Kyushu at \$2 500 000. In Egypt where the disease is hyperendemic the reduction in total economic productivity is estimated to be some 30% and the financial loss \$57 million annually. Medical treatment for 1700 American soldiers infected in Leyte during the war cost \$3 million and it was calculated that 300 000 working-days were lost. In *S. japonicum* infections the working ability of patients is reported to be reduced by 15-18% in mild cases, by 50-57% in moderate cases and by 72-80% in severe cases.

Most of the areas where bilharziasis is found are to a greater or lesser extent underdeveloped and the disease is found mainly among the agricultural population. Another characteristic of these areas is that irrigation is practised in one form or another by

streams channels from rivers the drainage of swamps or distributaries from canals. The presence of water of suitable velocity and temperature and of adequate vegetation and organic food is a prerequisite for the establishment of the snails which are the intermediate hosts of the schistosomes.

Bilharziasis is most commonly found among the less prosperous inhabitants of these under developed areas. Since the war there have been steadily increasing efforts to raise standards of living in these areas and among these inhabitants and great technical assistance projects are being planned or carried out to that effect. Part of this attempt to provide better living conditions consists in improving water supplies increasing the amount of irrigation by means of reservoirs and canals and making irrigation perennial where previously it was seasonal. One incidental and unforeseen result of these schemes is to provide ideal conditions for an extension in the range of the intermediate hosts of the bilharziasis parasite and this is in fact what is happening in a number of places. Bilharziasis is accordingly increasing in proportion as new irrigation projects create a greater number of suitable habitats for vector snails² and if the projects also bring together as they often do infected and non infected persons it does not take long for the non infected to become infected. In the Gezira area of the Sudan for example *S. haematobium* infection was seen only sporadically before the introduction of irrigation. A survey afterwards showed that the infection rate for children had reached as much as 80% in some places.

The situation in Egypt has been described by the Chairman of WHO's first advisory group on bilharziasis.

With no rainfall Egypt depends on the Nile for its life. There are at present 6 000 000 acres under cultivation. The development of irrigation schemes during the past century has resulted in the prosperity of the country and the increase of the population to 1400 people per square mile. In ancient times a system of dykes divided the fields into large basins which were flooded from September to October

when the flood water was drained back to the river. Under this system one single crop could be raised. The modern system of perennial irrigation ensures a water supply all the year round and an unbroken succession of crops. It entails storage of water in huge reservoirs and the digging of large distributary canals which ramify all over the country. A similar drainage system is now under development to prevent the water logging of the soil.

Upper Egypt from Asswan to Assiut with the exception of small districts is still under basin irrigation. The remaining parts of the valley and the Delta are under perennial irrigation. The permanent canals furnish an ideal environment for the breeding of the snail vectors of bilharziasis while their proximity to the villages exposes them to pollution and makes them a source of infection. Thus perennial irrigation is responsible for a high incidence of bilharziasis in areas where it has been established. Future change from basin to perennial irrigation will increase the spread of bilharziasis unless control measures go hand in hand with the development of the new irrigation schemes."

Life cycle of the bilharziasis parasite

The problem of the control of bilharziasis will be made clearer by a brief recapitulation of the life cycle of the schistosomes which cause the disease. The adult forms mature in the blood of a human being (or of another host) and the eggs are laid in the vesical plexus or the mesenteric plexus round the colon; the adult worms are capable of living for 20-30 years, the female producing eggs continuously. The eggs escape through the bladder or intestinal wall into the urine or faeces and on contact with water hatch producing free swimming larval forms called miracidia which must find suitable snail hosts within a certain time or perish. When a miracidium finds a suitable intermediate host it penetrates the skin and establishes itself in the snail passing through several generations and multiplying to form further free living larval forms called cercariae. These emerge from the snail and swim about until they find a human being. They then bore through the unbroken skin (or through the

Jo t OIH/WHO St dy Gr p o Bilharzias AS ca
(1952) R p o t on th fi t s l p 14 (1974 Hl H O g t h
R p S No 17)

Abd I Azim M (1948) P o b l m i th control f hst l
malaria in Egypt J Proc di z f th f th l mation
Cong sess on t r f al st di n d m larla 1948 Wa h u
DC. 1.2 p 1013

buccal mucosa if the water is swallowed) make their way to the liver mature and mate. The two sexes then make their way to the terminal blood vessels near the bladder or colon where the eggs are laid and the cycle begins over again.

The problem of control

Theoretically control over bilharziasis can be achieved by breaking the life cycle of the parasite at any one of a number of points. The adult worms could be killed in their human host. The eggs could be prevented from reaching water. The snail vectors could be eliminated. Human beings could refrain from drinking or entering contaminated water. In practice however the problem is enormously complicated as is obvious from the mere fact that the disease far from being brought under control is actually on the increase.

To begin with the drugs most commonly used to kill the adult worms in the human host are toxic unpleasant whether given by injection or orally and they involve a lengthy course of treatment during which little or no work should be done. The result is that the patients—who are usually ignorant and illiterate—often fail to continue treatment long enough to receive the full dosage. In Egypt for example where treatment has been carried out on a large scale for many years the number receiving treatment in any one year is only about 5% of the total number of infected persons in the country and the treatment given is generally never completed. The reservoir of infection is accordingly hardly affected and often the parasites are not killed because not enough drugs have been taken. Moreover even if the parasites have been killed reinfection rapidly occurs if the patient enters contaminated water for the drugs used in treatment when eliminated in the body leave the patient as subject to infection as before. The treatment must then be repeated after an interval or alternatively the patient must be shielded from further infection. If indeed he is subjected to a fresh and severe infection effective treatment may actually be dis-

advantageous to him by rendering him more vulnerable.

Another approach to the problem is along the lines of improved sanitation. If the eggs do not reach water they cannot hatch. Consequently if people are educated to urinate and defecate away from water and to refrain from drinking or entering contaminated water the life cycle of the parasite will be interrupted and the disease brought under control. To achieve this end habits dating back for thousands of years must be broken. Human excreta are widely used as a fertilizer in the endemic areas and there would be great opposition to any scheme to stop this traditional practice unless a substitute were provided. A religious requirement in some Moslem countries is that the anal and urethral orifices be washed with water after urination and defecation so that uncontaminated water would have to be made available and the water used prevented from conveying infection. All the countries where bilharziasis is prevalent are hot and in many the inhabitants especially the children keep themselves cool and clean by constant bathing in pools streams and canals which frequently are infected with snail vectors. The only way to prevent this would be to furnish bathing pools of clean chlorinated water.

The villages where the disease is rife are usually without sanitation and the cost of providing it on the scale needed is at present prohibitive in all but a few places. Moreover in irrigated agricultural areas such as the Nile Delta even if the peasant is provided in his villa with pure water and sanitary latrines he would only be able to use them to a limited extent since he spends the whole day away from the village in his fields under permanent temptation to use the water for all purposes. Where work takes peasants into fields full of contaminated water—certain rice fields in the Philippines for example—they could protect themselves by wearing suitable clothing. But protective clothing is expensive and burdensome to wear in a hot climate.

The problem of insanitary habits is far from being a simple one therefore and is

closely bound up with problems of levels of living traditional customs and economic and social development in each of the countries concerned

The other main line of attack on the schistosome has as its objective the elimination of the snail vector. Here too the problems are manifold. The natural history and ecology of the snails are insufficiently known. There is information about the effect on them of light heat desiccation the pH turbidity and rate of flow of the water in which they live and about the vegetation they are attracted to their predators the diseases from which they suffer and the chemicals which kill them but more knowledge is required. The classification of these snails has only recently been established and the exact number of species which can serve as intermediate hosts is not yet known. The optimum time and conditions for the destruction of each species are not certainly known and even if they were methods of preventing reinfestation from other sources have yet to be perfected.

Nor are these the only problems that arise. Although reservoir hosts appear to play little part in the maintenance of *S. mansoni* infections little is known on the subject and it is now thought that their importance in this respect may have been underestimated. A wide range of wild and domestic animals act as reservoir hosts for *S. japonicum*. Accordingly in any attempt to control bilharziasis by effective disposal of human excreta success will depend on a whole series of variables: the incidence of the disease in man its incidence in snails and in reservoir hosts the relative importance of the various hosts and the degree to which disposal is effective.

Another problem is that of immunity to the disease. As far as is known practically all human beings are susceptible to the disease regardless of race age and sex. But in isolated instances infections not renewed by further exposures tend to disappear spontaneously in a few years as the worms gradually die out. Their life span though it may extend to twenty years or more does not generally exceed five. This may lead

to a gradual disappearance of the disease in areas where the streams are no longer infested by vector snails and is clearly of great epidemiological importance. Nor is anything known about the reasons for the variability in the virulence of the disease in different localities.

Underlying all these problems is the question of the economic cost of control of the disease. Those who suffer from it are almost invariably the poor the ignorant and the uneducated in fact those who are most attached to traditional methods most unwilling to adopt any changes in their mode of life and most opposed to taking positive action on their own behalf unless the goal is an immediate and tangible one. The debilitating effect of bilharziasis too tends to confirm them in their apathy and distrust of innovation by making them averse to undue physical effort and they live in warm climates conducive to reduced exertion and suffer from other weakening diseases and deficiencies. The effort of educating them and inducing them to take positive measures to improve their health and adopt more hygienic habits calls for immense expenditure of time and patience and thus for an adequate supply of staff and for adequate funds. And there is also the cost of medicines of molluscicides and of preventive and clearance works. As a rule too the countries in which bilharziasis is rife are not wealthy and cannot unaided attack the disease on the scale required to make an impression on it. International action and assistance are therefore essential.

International action before WHO

The complexity of the problem of bilharziasis was not widely appreciated before the Second World War nor was there any clear understanding of the extent to which the debility and physical incapacity the disease causes hamper food production and involve countries where it is endemic and which can ill afford it in considerable economic loss. In 1938 the Egyptian delegate to the Health Organisation of the League of Nations proposed the establishment of

a Schistosomiasis Commission² to undertake work on bilharziasis analogous to that of the existing Malaria Commission. A meeting of experts was convened³ and they recommended in a report that research be undertaken into problems of epidemiology prophylaxis education and propaganda. Nothing came of these recommendations and for this a variety of reasons have been suggested. It was held that the experts were not representative of the areas where bilharziasis was endemic that there was a shortage of information about the disease and that the Health Committee as a whole did not discuss the proposals so that the problem of bilharziasis was not fully ventilated. These reasons may well be valid but the main reason why the recommendations fell into abeyance was the imminence of war with the disturbance it entailed in League activities.

During the war the United States was suddenly faced with an outbreak of the disease among its troops in China the Philippines and the island of the Pacific. At one time over 5000 soldiers were invalided home with acute *S. japonicum* infections. The United States defence departments took immediate and vigorous steps to combat the disease and the net result of this confrontation of a wealthy and advanced nation with a hitherto relatively obscure and neglected tropical disease was to stimulate interest in and research into the public health and medical problems it presented.

WHO studies the problem

When the Interim Commission of the World Health Organization met after the Second World War Dr Aly Tewfik Shousha⁴ the Egyptian member proposed that bilharziasis be placed on the agenda of the First World Health Assembly. At the request of the Interim Commission he prepared a memorandum with the title

Hilmy A. (1939) Proposal to establish a Schistosomiasis Commission. Geneva (League of Nations Health Organization, C.H. 1358).

League of Nations Health Organization (1938) Control of bilharziasis (schistosomiasis). Geneva (C.H. 1355).

D. Shousha later served as Director of the WHO Regional Office for the Eastern Mediterranean from 1949 to 1957.

"Schistosomiasis (bilharziasis) a world scourge" and presented it to the fourth session. His description of bilharziasis and its effects led the Interim Commission to recommend that WHO collect data on the incidence and distribution of the disease on measures taken to combat it and on its economic effects provide governments with the fullest possible information on it and set up an advisory committee of experts to study it.

The First World Health Assembly in 1948 adopted the Interim Commission's recommendation and agreed that a committee of experts on parasitic diseases and a panel of experts possessing specialized knowledge of such diseases be established that the staff for this group of diseases include at least one well-qualified parasitologist with field experience and that the first object of study be bilharziasis¹⁰. In due course an Expert Committee on Bilharziasis was set up but before it met WHO jointly with the Office International d'Hygiene Publique (OIHP) convened a group of experts to examine the problem of bilharziasis in Africa.

This Study Group on Bilharziasis in Africa met in Cairo in October 1949 in the office of the Bilharzia Snail Destruction Section of the Egyptian Ministry of Public Health¹¹. It called for surveys of the incidence and intensity of bilharziasis throughout the world so as to provide a complete and more accurate picture of its geographical distribution and stressed the importance of uniform surveying methods and the need for sufficient staff to carry out the surveys. The distribution of the snail vectors also required determination and here uniform classification and nomenclature were essential. Hitherto classification had been based on the external characteristics of the shells but this system had caused complication and confusion and needed to be replaced by classification based on the internal morphology of the snails and their ecological characteristics. It was suggested that WHO should

¹⁰ Cf. *Rec. Wld. Hlth. O.* 1948 13 309.
Wld. Hlth. O. J. 1949 17 17.

make arrangements to facilitate and standardize the identification of specimens

The Joint Study Group then discussed the significance of bilharziasis as a cause of mortality morbidity and loss of productive power. Quantitative knowledge was required of the relationship between the incidence and intensity of the infection and the loss of productive power in the individual with the economic consequences this entailed. Not enough was known about the development of immunity after infection and here too research was required.

Diagnostic methods in use were many and often the results they achieved were not comparable. The Joint Study Group accordingly examined and weighed the pros and cons of various methods of diagnosis and made certain recommendations for improvement or increased uniformity.

The Group then turned to the question of bilharziasis control. Although a number of methods have yielded results, it observed that appear to make the above objects [prevention of the pollution of streams, destruction of the intermediate hosts, sterilization of the human reservoir] attainable, yet no one single method has proved entirely or permanently successful and brought about the eradication or even satisfactory control of the disease. It would appear that a combined attack on the disease by several methods is required to meet with success.¹ The Group examined the various methods that had been tried to prevent the pollution of streams, to destroy the snails, and to treat the patients. It recommended among other things that WHO grant fellowships in bilharziasis survey and control for a considerable part of the problem of control was due to the lack of properly trained staff in the field.

Finally it sounded a note of warning about the relationship between irrigation schemes and the spread of bilharziasis and recommended various precautionary measures that might mitigate the sanitary risk involved. These included administrative and technical safeguards and postulated close co-operation between the irrigation engineering staff and

the public health authorities. The Executive Board of WHO, noting this warning, requested the Director General to bring the dangers mentioned and the Joint Study Group's recommendations to the attention of governments and international organizations interested in irrigation schemes and a letter to that effect was duly dispatched.

The WHO Expert Committee on Bilharziasis met in Puerto Rico in 1952. By then some surveys of the geographical distribution of bilharziasis in various areas had been carried out in accordance with the recommendations of the Joint Study Group and were before the Committee. But it was compelled to conclude that the information available while showing the wide distribution of actual and potential vectors of bilharziasis in tropical and sub-tropical areas throughout the world and of human infection from various schistosome species, gave no adequate measure of the true prevalence and severity of bilharziasis as a disease or as a cause of disability or of death.¹³ This was hardly surprising; it added as most health administrations were themselves ignorant of the true extent of infection in their own territories. The Committee accordingly recommended that WHO sponsor and publish surveys of the disease and of the distribution of vector snails. In order to simplify identification of vector snails, the publication of comparatively easy keys for the determination of species would be of great value to the non-specialists who would necessarily be engaged on such surveys.

The Committee also made a critical analysis of methods of diagnosis of bilharziasis with special reference to their applicability for while a presumptive diagnosis was possible in a known endemic area, many errors resulted from unsupported clinical diagnoses since several other diseases simulated bilharziasis. Thus laboratory diagnosis was essential and standardized and accurate methods were required to make the results comparable whatever the laboratory in which the diagnosis was made.

There was continuing confusion about the

status of many species of snails in spite of the arrangements WHO had made in 1950 in accordance with the Joint Study Group's recommendation for expert identification of specimens. The Committee recommended that those arrangements be continued and expanded and that three malacologists possessing a special knowledge of vectors of human schistosomes undertake identification of specimens forwarded by health administrations and interested individuals. The ecology of molluscan intermediate hosts, the ability of certain species to serve as vectors, vector-parasite relationships—particularly the influence of chemical, physical and meteorological environmental factors on the susceptibility of snails to schistosome infection—and the physiology of intermediate hosts all required additional study for they might provide clues to variations in susceptibility to infection and to the mode of action of molluscicides.

The Committee noted that in spite of WHO's cautionary notice to governments on the risk of introducing or extending the range of bilharziasis as a result of irrigation schemes, co-operation between health administrations and irrigation authorities had not been achieved in many areas or had not been as close as was necessary. The need for screening and treating the human population when it migrated as it was doing on a large scale in Africa, especially when it migrated into an irrigated area, was most important, and the local authorities were responsible for providing the population with sanitary equipment and conditions and adequate health education in order to cope with the increased risk due to its concentration. This concentration of the population made such measures practicable as they would not be if it were scattered.

The Committee made recommendations regarding the standardization of procedures for epidemiological surveys of bilharziasis, the measurement of its incidence and its social importance, morbidity and mortality rates, its anatomical localization, clinical gravity and complications, the study of conditions—geographical, helminthological, malacological and human—governing its

transmission and the lines along which preventive action should be taken. "Assessment of the local factors governing the effectiveness of each preventive action" it held "is in practice the most important part of a bilharziasis survey. It is also the most complicated. What is required is the integration of bilharziasis control measures in the health programme and even in the general economy of the country."¹⁴ There should therefore be studies of conditions governing transmission of the disease, of economic conditions and of ethnological conditions in the area or country affected, and the results of previous experiments in prophylaxis should be carefully assessed.

The Committee then turned its attention to control methods and particularly to the use of molluscicides and other means of snail destruction which it considered to be the most important single method of preventing bilharziasis. It reviewed at length the qualities desirable in an ideal molluscicide and the molluscicides available, discussing the extent to which they fell short of the ideal, noted that biological methods of control had not received the attention they deserved and made various recommendations for more effective snail control.

Finally it examined methods of treatment. There was much variation in the behaviour of the same parasite in different localities so that it was necessary to establish a method of treatment for each area. Standards and methods of assessing cure had altered a great deal in recent years and it was difficult to compare work with what had been done years before. It would therefore be a most useful service to test drugs in common use again in as many endemic areas as possible so that therapeutic efficiency tables might be compiled for each area.

Within a short time of the Expert Committee's meeting there was an opportunity to put the recommendations of the Joint Study Group and the Expert Committee on Bilharziasis into effect. The United States Army in the Philippines had discovered the prevalence of *S. japonicum* infection there

during the war. A survey of the disease was carried out in 1949-1950¹⁵ under a bilharziasis research programme instituted by the Department of Health of the Philippines and as a result the Government created a Division of Schistosomiasis in that Department in 1951 to cope with a problem whose importance was made evident by the survey. At the request of the Government WHO sent a team of consultants to the Philippines in 1952 to examine what was being done and to make recommendations for a national programme. The team came to the conclusion that thinly spread efforts to deal with the disease would be more or less unrewarding and that it would be better to concentrate funds and efforts on a pilot project in the island of Leyte which appeared to be the most important endemic area. In 1953 the project was started with WHO advisers and aid and with assistance also from the Foreign Operations Administration of the United States and from the Philippine Council for United States Aid. This was the first large project carried out internationally under the auspices of WHO for the control of bilharziasis.

The Leyte bilharziasis project is discussed at length in another article¹⁶. It provides an admirable illustration of the painstaking and time-consuming studies required as a preliminary to controlling bilharziasis and of the results that can be achieved if the attack on the disease is conducted on a wide front and with proper planning.

Both the Joint Study Group and the WHO Expert Committee on Bilharziasis had emphasized the confusion regarding the status of many species of snail vector. WHO accordingly convened in Paris in 1954 a Study Group on Bilharzia Snail Vector Identification and Classification¹⁷. This Group considered principles of classification and criteria for identification, discussed the knowledge already available on the snail vectors, made suggestions on the essential data that should accompany all collections sent for identification and submitted recom-

mendations for future research and international co-ordination. It also compiled a tentative list of various African species of *Biomphalaria* which were known or suspected to be vectors.

Yet another obscure subject noted by the Expert Committee on Bilharziasis was the relationship between the ecology of the habitats of snail vectors, their life cycles, their breeding and other habits and the process whereby they infected man. WHO convened yet another body of experts to consider this problem, the Study Group on the Ecology of Intermediate Snail Hosts of Bilharziasis which met in Paris in 1956¹⁸.

The Study Group examined the distribution of intermediate snail hosts in relation to hydrogeology and factors influencing their habitat and breeding conditions, physical factors such as temperature, light intensity, the movement, depth and level of water, desiccation, chemical factors such as salinity, ion balance, hydrogen ion concentration, general factors such as pollution and biological factors such as natural enemies and predators, parasites and diseases, food preferences and vegetation. Seasonal and climatic factors influencing their life cycle were also discussed. In the light of the knowledge available concerning the ecology of these snails, the Study Group then considered bilharziasis control measures: the use of molluscicides, sanitation, irrigation engineering, water management and modifications in fishing and farming practices and made various suggestions about each of these subjects. Some of these methods of controlling bilharziasis are reviewed at greater length in other articles.

The Study Group wound up its meeting with various proposals regarding methods of sampling to be used in measuring the density of mollusc populations during surveys and for the evaluation of results of control methods and made suggestions for further studies in ecology and physiology in relation to control methods. It noted that the development of ecological research had now reached a point where extensive field studies could no longer be carried out by individuals

so that co-operation between specialists in different disciplines was required. Such co-operation might have to be international in nature as few countries could themselves provide all the experts needed.

Later in 1956 WHO convened an African Conference on Bilharziasis which met in Brazzaville, French Equatorial Africa.¹⁹ The Conference examined the series of surveys of bilharziasis made by WHO consultants between 1950 and 1956 in accordance with the recommendations of the Joint OIHP/WHO Study Group and the Expert Committee on Bilharziasis and suggested that maps be produced to show the distribution of the disease of each of the intermediate hosts and of animal schistosomiasis. It discussed the distribution of each of these in detail and the gaps in existing knowledge noting that in the whole of Africa south of the Sahara there were only a few areas where bilharziasis did not occur.

One of the great dangers in Africa was as earlier WHO reports had noted the spread of bilharziasis by the introduction or extension of irrigation schemes. A sharp increase in infection had already occurred in one region of the Belgian Congo and in the Eastern Transvaal.

The Conference discussed problems related to the victim of the disease to morbidity and mortality—noting that certain signs and symptoms had to be taken into consideration when an attempt was made to evaluate the degree of morbidity due to the disease—to methods employed in epidemiological surveys to reinfection receptivity and resistance to infection to the possible connexion between diet and the pathogenicity of the parasite to associated psychological disturbances and to the moot question whether human schistosomes had a carcinogenic action. Turning to the factors influencing the epidemiology of bilharziasis it examined the intermediate host-parasite complex, the importance of animal reservoirs, the influence of human concentration and the extension of irrigation operations. Each of the molluscicides in common use received attention, then the problem of mass treatment as a

method of control and parasitological and immunological means of assessing cure. The Conference made recommendations on all these subjects as well as on environmental sanitation measures, on water management on health education on the need for collaboration between health authorities and the governmental and private agencies concerned in the study and execution of control measures and on international co-ordination of bilharziasis control and research exchange of information and training of personnel. Many of these recommendations endorsed earlier recommendations by WHO groups and committees which the Conference wished to reinforce with all its authority particularly as in many cases they had by no means been put completely into effect.

The Joint Committee on Health Policy of the United Nations Children's Fund (UNICEF) and WHO discussed and produced reports on the progress of bilharziasis control programmes at their tenth²⁰ and eleventh²¹ sessions. UNICEF is particularly interested in bilharziasis because the usual epidemiological picture of this disease is one of high incidence in the younger age groups. The data obtained by WHO consultants in Africa show that the infection rate for children is much higher than for adults. They become infected at the age of two years or as soon as they are able to walk, and are responsible for making local endemicity high in rural areas because of their habits of playing in the water and of indiscriminate pollution. Eggs excreted by children hatch more easily and have greater infectivity and the transmission index²² is therefore relatively higher. In the Leyte bilharziasis project for example it was found that this index was 1.2/ for the age group 50-59 years was 59.9/ for the age group 10-14 years.

WHO surveys and control projects

WHO's policy in respect of bilharziasis is based on the findings and recommendations of its various committees, study groups and

U P bilhcd working document JCI0/UNICEF WHO/3

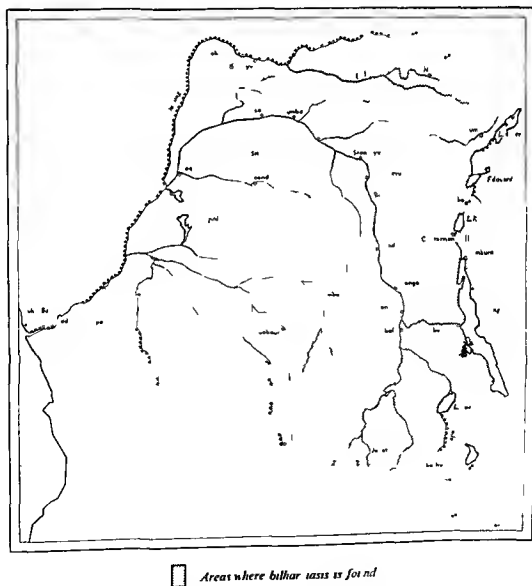
U P bilhcd working document JCI1/UNICEF WHO 4

²² See page 47

conferences on the subject. Among its aims are the identification and classification of the intermediate hosts and the parasites, the study in laboratories and in the field of the ecology of the snail vectors, the development of standard methods in epidemiological surveys, the study of water management and engineering techniques for the prevention of the spread of bilharziasis, co-operation between the biologists, zoologists, chemists, engineers, health educators and public health

officials whose joint efforts are a prerequisite for the successful control of the disease, the provision of training courses for the specialized staff required, the development of new molluscicides and better formulations with a view to increasing their efficacy, rendering their application easier and reducing the cost of treatment, the development and trial of new therapeutic drugs, and the study through pilot projects of local epidemiology and of human, animal and snail ecology.

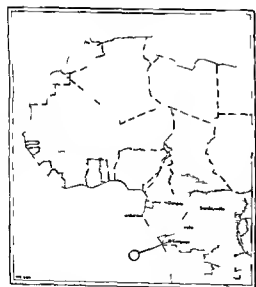
FIG. 1. DISTRIBUTION OF BILHARZIASIS DUE TO *S. MANSONI* IN BELGIAN CONGO



so that advice can be given on the most economical and effective methods of control of the disease

In carrying out this policy WHO has sent teams of experts to make surveys of the geographical distribution of bilharziasis and of the intermediate hosts of the schistosomes in Africa the Eastern Mediterranean and the Philippines. Investigations were undertaken in African territories between 1950 and 1957 and later surveys were made in 1955 and 1956. The first of these surveys covered the Belgian Congo and Ruanda Urundi.²³ Here intestinal bilharziasis caused by *S. mansoni* is endemic in a large area (see Fig 1) infection by *S. haematobium* is relatively unimportant

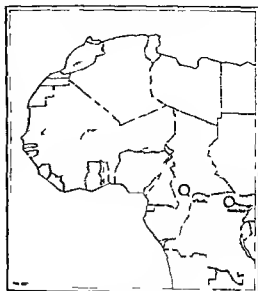
FIG 2 INCIDENCE OF BILHARZIASIS DUE TO *S. MANSONI* AND DISTRIBUTION OF *S. INTERCALATUM* IN WEST AND CENTRAL AFRICA 1948-1950



High incidence
Moderate incidence
Low incidence

Foci of *S. mansoni*

FIG 3 INCIDENCE OF BILHARZIASIS DUE TO *S. HAEMATOBIMUM* IN WEST AND CENTRAL AFRICA 1948-1950



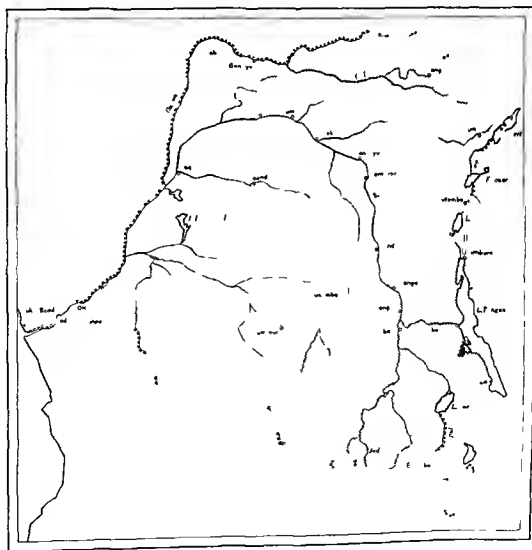
High incidence
Moderate incidence
Low incidence

The second survey dealt with bilharziasis in Western and Central Africa²⁴ (see Figs 2 and 3) where infection by both *S. mansoni* and *S. haematobium* is widespread and there are isolated centres of infection by *S. intercalatum* a species found sporadically in the Belgian Congo as well which also causes intestinal bilharziasis

The next survey²⁵ was of Madagascar Reunion and Mauritius (see Fig 4). In Madagascar whereas infection by *S. haematobium* is confined to the western portion of the island infection by *S. mansoni* is found only on the southern half of the east coast, except for a small area which overlaps that of *S. haematobium*. Two-fifths of the island are free from the disease and Reunion is completely free. In Mauritius only the urinary form is present but the incidence is

conferences on the subject. Among its aims are the identification and classification of the intermediate hosts and the parasites, the study in laboratories and in the field of the ecology of the snail vectors, the development of standard methods in epidemiological surveys, the study of water management and engineering techniques for the prevention of the spread of bilharziasis, co-operation between the biologists, zoologists, chemists, engineers, health educators and public health

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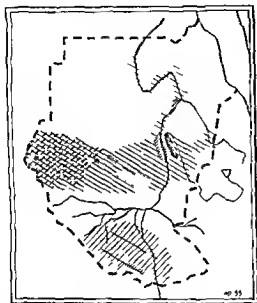
FIG. 1. DISTRIBUTION OF BILHARZIASIS DUE TO *S. MANSONI* IN BELGIAN CONGO




Areas where bilharziasis is found

low and the disease does not present a serious public health problem.

Another survey covered British Somaliland, Eritrea, Ethiopia, Somalia, the Sudan and Yemen²⁴ yet another the Eastern Mediterranean Region²⁵ including Iraq, Israel, Jordan, Lebanon, Saudi Arabia and Syria. Bilharziasis of both kinds is particularly prevalent in the Sudan (see Fig. 5) and the un-

FIG. 5. BILHARZIASIS IN THE SUDAN.



-  Estimate of *S. mansoni*
 10-40 + *S. haematobium*
 10-40 + *S. mansoni*

any form is endemic in Iraq (see Fig. 6) where the situation was compared to that of Egypt a century ago before the intensification of agriculture and the ensuing sharp increase in population. The health problems that will be created after the completion of the great irrigation works planned and partly

under way in Iraq might well be viewed with alarm.²⁶ The other Eastern Mediterranean countries surveyed are relatively little affected by the disease but some contain foci of disease others suitable habitats for the vector snails. Other surveys were of British West and East Africa and the Federation of Rhodesia and Nyasaland²⁷ of Basutoland²⁸ of Bechuanaland²⁹ and of the British Cameroons.³⁰

These surveys were submitted to the African Conference on Bilharziasis in 1956.³¹ They sought not only to assess the incidence and prevalence of the disease in the territories with which they were concerned but also to establish the geographical distribution of possible vector snails and to describe the treatment and methods of control in use. And they provided the first picture admittedly an incomplete one of the distribution of bilharziasis in Africa and the Eastern Mediterranean Region of the directions in which it might spread and of what was being done to control it.

WHO has also encouraged three central laboratories of malacology—in Copenhagen, Paris and Salisbury, Rhodesia—to study the identification of the species of snails collected during surveys, the close collaboration between these centres and workers in the field has made it possible to make a provisional map of the geographical distribution of intermediate hosts in Africa. A monograph on the African Planorbidae has been prepared³² and it is hoped that the American Planorbidae will also be described. Knowledge of the ecology of the intermediate hosts has been greatly advanced by the Levite bilharziasis project. A WHO team working in East Africa in the Institute of Malaria and Vector Borne Diseases, Amant, will also carry out ecological studies of snails as part of its work.

B. R. Wild H. H. Org. 1956, 14, 416

B. R. Wild H. H. Org. 1956, 15, 203

B. R. Wild H. H. Org. 1956, 18, 1049

B. R. Wild H. H. Org. 1956, 18, 1051

B. R. Wild H. H. Org. 1956, 18, 105

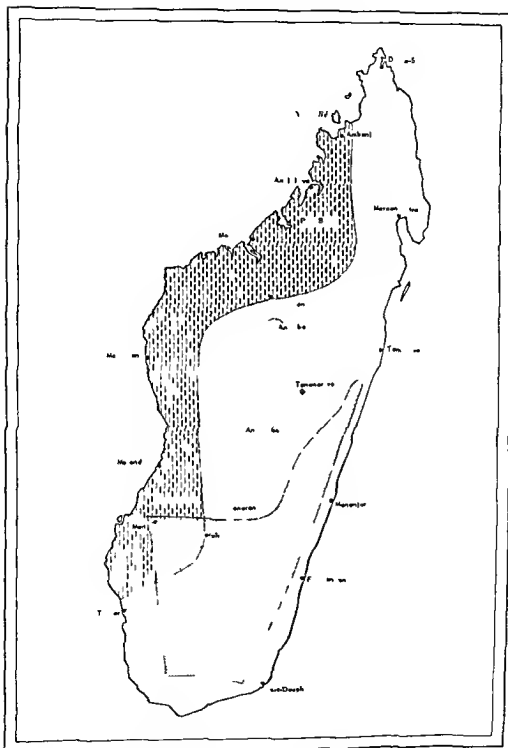
²⁶ See page 13

³² Mandahl-Barth, G. (1956) *Intermediate hosts of Schistosoma*. Geneva: (1) World Health Organization, (2) Monograph Series No. 37.


²⁴ B. R. Wild H. H. Org. 1956, 14, 1

B. R. Wild H. H. Org. 1956, 14, 403

FIG 4 BILHARZIASIS IN MADAGASCAR



 *Bilharziasis due to S. haematobium*

 *Bilharziasis due to S. mansoni*

WHO with the assistance of two expert consultants—an epidemiologist and an irrigation engineer—has now begun the study of problems of control and prevention of the spread of bilharziasis in relation to irrigation engineering practices. An advisory team of consultants has been sent to countries where irrigation schemes may lead to such an extension in the range of the disease with a view to developing practical methods of obviating the danger.

The provision of sufficient qualified staff to carry out surveys and help in the control of bilharziasis has been advocated constantly since the first WHO advisory groups met to consider this disease. They have all stressed the need to train key workers in malacology, ecology, epidemiology, parasitology and sanitary engineering. WHO has accordingly given high priority to training and has organized an inter regional training course in bilharziasis for key workers such as epidemiologists, biologists and sanitary engineers.

Finally apart from those surveys which WHO carries out itself to determine the distribution of the disease or of the snail vectors or at the request of governments to assess the extent of the problem of bilharziasis in their territories, it assists governments in the control of the disease in Egypt, Syria, Iraq and the Philippines and is in close touch with work carried out in the Latin American countries with the assistance of its Regional Office for the Americas. Demonstrations of methods of control have been given in Eastern Mediterranean countries. Assistance is also to be given to new control projects in the Federation of Rhodesia and Nyasaland, Ghana, Somalia and Iran. It is WHO's policy to adapt methods to local conditions and not to launch upon any large scale scheme of control until carefully planned pilot experiments are carried out. In Egypt and Iraq preliminary surveys were made as a basis for the planning of projects and in the Philippines they are an essential aspect of the programmes.

BILHARZIASIS AS A MAN MADE DISEASE

It is a tragic irony that in many parts of the world the vast irrigation schemes constructed with the aim of improving the standard of living have had the effect of undermining the health of the areas they serve. The networks of canals designed to carry water to arid territories have proved ideally suited for carrying bilharziasis—and sometimes other diseases—to the inhabitants. Still more important is the fact that before the introduction of perennial irrigation, bilharziasis was almost unknown in many of these areas. For this reason bilharziasis has been termed a "man made" disease.

The connexion between irrigation and bilharziasis was sometimes overlooked by irrigation engineers in the past but as early as 1937 careful surveys conducted in the Quena and Aswan provinces of Egypt provided striking confirmation of the relationship. Within three years of the introduction of perennial irrigation in these provinces

the prevalence of bilharziasis showed the following increases:

	Per 1000 of population infected	
	1934	1937
Sabaia	10	44
Kalh	7	50
Mansouria	11	64
Bubban	2	75

A similar correlation was observed in the Belgian Congo where in one area the bilharziasis infection rate increased from 3.4 / to 30.35 / in the space of 12 months following the extension of rice irrigation schemes and many of the new cases were more severe than those previously encountered. In Southern Rhodesia the Umshandige Irrigation Scheme costing three million pounds had to be abandoned in 1949 ten years after its commencement, mainly because the prevalence of bilharziasis had reached such menacing proportions.

FIG 6 ENDEMIC BILHARZIASIS IN IRAQ



Methodology in epidemiological surveys has also received great impetus from the Leyte bilharziasis project in which standard techniques have been developed for the study and measurement of the disease in man and in animals for the assessment of methods of control and for the determination

of the relationship between the infection and its economic effects on the individual. WHO is carrying out skin testing experiments in Iraq and encouraging their trial in Iran so as to standardize this method of diagnosis of bilharziasis and assess its value as an epidemiological tool.

Despite continual advice given by the Health Department, irrigation schemes are planned and developed without due consideration of the health aspects. There is absolutely no doubt that every irrigation area in the Colony will become infested with vector snails which will eventually become infected with bilharzias unless the danger is realized at the outset and plans for prevention made. The statement has been made before and must be made again that large irrigation schemes may well wreck the health of the country and bring the most grandiose schemes to a pitiful end.

WHO is continuing its efforts to press home this lesson. In a report on public health conditions in the non self governing territories submitted to the United Nations in 1955⁴ it referred to the concern of medical authorities in some of the territories about the large number of irrigation schemes being carried out without previous consultation with health officers. The report continued

These important schemes with their large dams and extensive networks of waterways are essential to agricultural development and are potentially a source of much good to the people. Since they represent the hope of more food and a better standard of living and therefore better health. But this object may be defeated if there is lack of co-operation between all concerned at the beginning, and if as a result much bigger and better breeding places for infected snails and other disease vectors are provided.

Two papers recently published in the WHO Bulletin⁵ again draw attention to the seriousness of the situation and discuss the ecological and engineering aspects of snail control in engineering systems. Some of the more important considerations and recommendations are summarized below.

Where snails thrive

Not all parts of an irrigation system are equally suitable for the development of bilharzias intermediate hosts. A comparison of the conditions in those sections where the snails thrive and those where they do not taken in conjunction with studies of

natural habitats provides valuable pointers to the control methods that might be applied by the engineer. Thus it is observed that the snails are confined mainly to the smaller branches of the canal system. They are usually absent from the main feeder canals where the swifter flow of water and high turbidity create unfavourable conditions. Again the smaller channels that are lined with brick, stone or cement are usually free from snails because they do not support plant life for the snails to feed on, but they are often found where a deposit of silt forms and aquatic plants grow. In general mud lined channel with a gentle flow of water offer the most favourable habitats for bilharzias snails. Even if such channels are allowed to dry out from time to time many of the snails are able to survive in the bottom mud particularly where the ground water level is sufficiently high to keep the earth moist and cool. However in channels that repeatedly dry out completely the snails are unable to maintain an existence. If the canals are lined with concrete or similar material drying out even for short periods will kill all snails and their eggs.

Large reservoirs are not as a rule good habitats for bilharzias vectors but such snails may be found in shallow sheltered bays created by irregularities in the shore.

Other parts of irrigation channels that form excellent habitats for snails are culvert heads, drainage channels carrying water away from irrigated areas and the tail pools that form at the end of irrigation channels in some systems. Seepage pools and channels do not usually harbour snails as they are very shallow subject to large and rapid changes of temperature and often of a temporary nature.

Food and water

It is obvious that no body of water can support a snail colony unless it provides suitable food. As pointed out in an ecological study reported recently in the WHO Bulletin "The food of bilharzias vectors is largely vegetal consisting of microflora which form the main constituent of the

United Nations (1955) Special report on health conditions in non-self governing territories. N. Y. U. N. p. 74.
 5. J. M. (1958) B. II. H. M. H. A. Org. 18 233
 6. N. (1958) B. II. H. M. H. A. Org. 18 1051



An irrigation canal in the Eastern Mediterranean Region perfect for a cooling bath on a hot day equally perfect also for infection by cercariae emerging from the vector snails which find in such a canal an ideal habitat

Unheeded warnings

The spreading of bilharziasis through irrigation schemes has been of concern to WHO since its inception and repeated warnings have been sent to governments particularly those responsible for the administration of non self governing territories. The Joint OIHP/WHO Study Group on Bilharziasis in Africa¹ which met in 1949 drew attention to the problem and proposed a number of administrative and technical safeguards including close collaboration between the public health authorities and those responsible for planning irrigation schemes. In 1950 the WHO Executive Board requested that these recommendations should be brought to the attention of governments

and of the appropriate bodies and specialized agencies of the United Nations interested in irrigation. Three years later however the WHO Expert Committee on Bilharziasis noted in its first report

"In spite of the formal cautionary notice issued by WHO to all governments and interested inter-governmental agencies on the risk of introducing or increasing the intensity of bilharziasis as a result of irrigation schemes it is obvious that co-operation between health administrations and the authorities responsible for irrigation has not in many areas been achieved or been as close as was necessary"

And the Department of Health for South ern Rhodesia noted in its annual report for 1953²

¹ *Wld Hlth Org t h R p S* 1953 65
² *So th r Rhodesia (1954) R p t on th p h l th f th y* 1953 S l bury p 8

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WHO is continuing its efforts to press home this lesson. In a report on public health conditions in the non-self governing territories submitted to the United Nations in 1955¹ it referred to the concern of medical authorities in some of the territories about the large number of irrigation schemes being carried out without previous consultation with health officers. The report continued:

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¹ United Nations (1955) *Special report on public conditions in non-self-governing territories*. New York, p. 74.

² Watson J. M. (1955) B. II. *WHO Hk. Org. J.* 18, 833.
³ Ibid. J. N. (1955) B. II. *WHO Hk. Org. J.* 18, 1011.

slimy layer encrusting the submerged plants and commonly known as periphyton. These microflora multiply rapidly to form a scummy layer on the submerged stems and leaves of plants, on the under surface of floating leaves on the bottom mud on stones on gravel and on any slitsam. The presence of this periphyton or plankton—mainly algae—is essential for the establishment of breeding colonies as the young snails are dependent on this type of food at least in some species. On the other hand even adult snails can subsist on this diet alone. This is important because a growth of algae will sometimes appear on the sides of channels lined with brick stone or cement if the flow of water is gentle and continuous and snails may then make their appearance.

Snails do not appear to be very dependent on the physical or chemical nature of the water: they are tolerant of a wide range of pH, hardness and alkalinity and numerous analyses of waters from different habitats have failed to reveal a consistent pattern in the mineral composition. The salinity of the water appears to be the most important limiting factor and in Africa snails are rarely found in waters which contain less than 10 parts per million (p.p.m.) or more than 430 p.p.m. of dissolved salts although in Iraq *Bulinus truncatus* is found in waters with a salinity up to 1010 p.p.m. and even higher concentrations are tolerated in the laboratory. Strongly acid waters may be fatal to snails but are rarely encountered in practice. The extremes of water quality that would be unfavourable to snails would not be acceptable for agricultural purposes. As Lanoix puts it: "Water which is good for irrigation is also good for snail development."

Weeds

Although young snails feed mainly on plankton and are not dependent on higher plants for food, the presence of aquatic weeds in irrigation canals favours the establishment of snail colonies for a variety of reasons.

The plants slow down the current, oxygenate the water and provide shade from excessive sunlight shelter from predators, food for adult snails and suitable surfaces on which the snails can crawl and deposit their egg masses. Furthermore the leaves and stems are usually covered with algae and the decaying leaves themselves provide additional food and humus. But it is not only because weeds encourage snails that their presence in irrigation canals is undesirable. They also seriously impair the efficiency of the canals, clogging the irrigation structures and drains, reducing the capacity and velocity of flow and permitting the deposit of silt. At the same time they increase losses due to seepage and transpiration. The public health administrator, the farmer and the irrigation engineer are therefore at one in wishing to keep the irrigation system as free from weeds as possible.

Control measures

Canal design

It is clear that any features of canal design that prevent the growth of weeds and algae will also keep the irrigation systems free from bilharziasis vectors. Though much work still needs to be done to establish which designs give the best results at the lowest cost, there can be no doubt that lining the canal with a hard material such as stone, brick or concrete almost entirely suppresses the growth of aquatic plants. The best of these materials is concrete. Asphalt or plastics usually require a further lining of earth and are not therefore of much value for reducing aquatic growth. In some areas where concrete linings have been tried they have proved extremely effective in keeping the canals free from snails, but it is not yet certain that they are equally satisfactory against all species and under all conditions.

Another important aspect of canal design is the speed at which the water flows, which is dependent on a number of factors, especially the steepness of the canal slope and the size and shape of the channel. A high velocity is desirable from the point of view of snail

Making the irrigation canal perpendicular to the current flow is the only thing that the agricultural vegetation which produces food and refuge for the snail obtains the least possible hold in the



control and also has advantages for the irrigation engineer. The higher the velocity the smaller is the canal section required. Construction costs are therefore reduced although for velocities exceeding 1.5 metres per second this saving is offset by the expense of lining the canal to prevent erosion. In the long run however lined canals are cheaper as they have a long life—at least 40 years for a good quality concrete lining—and require little maintenance. With a high rate of flow maintenance costs are further reduced because the deposition of silt is prevented. For the farmer swift flowing lined canals offer the advantages of requiring a narrower right of way and hence saving

land and of preventing seepage losses thus protecting lowlands from waterlogging and conserving water for crops.

Although snails are usually absent from fast flowing canals little is yet known regarding the maximum current velocities that are tolerated by them for varying periods of time and in the presence of different types and quantities of suspended matter. Breeding colonies of snails have been observed however in canals with a continuous flow of up to 20 metres per minute. The engineer and the malacologist on the spot must decide between them the most effective velocities that can be economically employed and which canals need a hard lining. Main

canals and the smaller distribution channels and furrows can often be left unlined and it may be desirable and more practical to restrict the lining of secondary and tertiary canals to the portions situated near communities

Covered irrigation systems

One way of eliminating both snails and weeds from irrigation systems is to distribute the water in pipes instead of in open canals. This also prevents infection of human beings and pollution of the water by urine and faeces and by keeping down mosquitos is a valuable measure of malaria control. Closed systems such as normally used for the distribution of domestic water are initially very expensive but semi-closed systems which operate at lower pressures seem to offer considerable promise and are receiving increasing attention in the United States, North Africa and elsewhere. The simple covering in of the irrigation channels a method formerly recommended has not been found satisfactory. Although it shuts out sunlight and eliminates most aquatic growth certain aquatic fungi, bacteria and invertebrates are able to flourish and these permit the establishment of snail colonies.

In many areas people are dependent on canal waters for washing and bathing. If the canals were to be replaced by a covered irrigation system alternative facilities would have to be provided and these should naturally be free from infection. The provision of chlorinated swimming pools is highly desirable but in addition it might be possible to make a piped irrigation system serve a dual purpose: the supply of water for irrigation and the supply of raw water for rural communities and individual farmhouses

along the pipe route. Such a water supply would still need purification of course to make it potable.

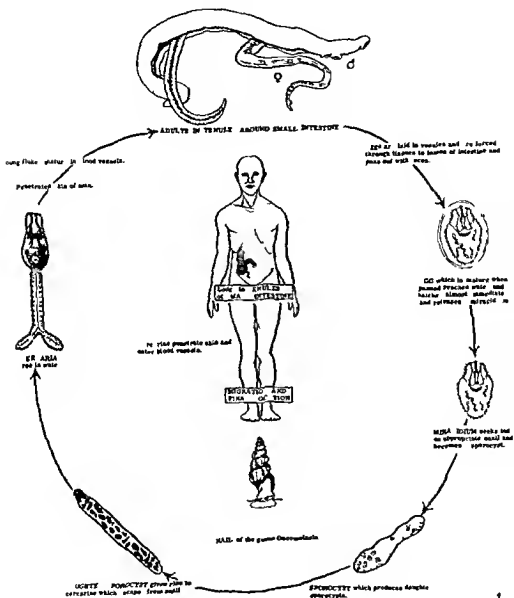
Other measures

Modifications in canal design appear to offer reasonable hope of successful snail control in irrigation systems and while initially they are expensive in the long run they are likely to prove the most economical measure for the purpose. Various hand and mechanical methods of controlling weeds have been used but they are not very effective besides being cumbersome and expensive. Chemical control is also possible and much cheaper. Changes in water level are not very effective in reducing snail populations unless large rapid and fairly frequent but they may sometimes be of value in reservoirs. Culvert heads are particularly favourite habitats for bilharziasis vectors and need special attention: they should be constructed entirely of cement and the floor should be at the same level as the culvert itself.

* * *

There is a great need for further research into snail ecology and the various aspects of canal design that influence the establishment of snail colonies. Above all the engineer needs the guidance of the malacologist and the epidemiologist: experimental work and pilot studies by such a three man team should go far towards establishing the most efficient snail-control measures that could be economically applied to the irrigation systems in any particular area. Irrigation could then become as it was always intended to be a boon and not a bane to the people of the under-watered countries.

BILHARZIASIS IN THE LABORATORY



Man is infected with bilharziasis from water in which swim cercariae free living forms of the schistosome parasite. The cercariae penetrate the skin and make their way to the liver, lungs, heart or main lymphatics. There they mature and parthenogenetically then proceed to the mesenteric veins or the venous plexus around the bladder where the females begin to lay their eggs. The eggs are voided in the urine or faeces and hatch on contact with water producing miracidia which enter various species of snails and pass through the digestive system and emerge as cercariae to complete the life cycle (1).

canals and the smaller distribution channels and furrows can often be left unlined and it may be desirable and more practical to restrict the lining of secondary and tertiary canals to the portions situated near communities

Covered irrigation systems

One way of eliminating both snails and weeds from irrigation systems is to distribute the water in pipes instead of in open canals. This also prevents infection of human beings and pollution of the water by urine and faeces and by keeping down mosquitos is a valuable measure of malaria control. Closed systems such as normally used for the distribution of domestic water are initially very expensive but semi-closed systems which operate at lower pressures seem to offer considerable promise and are receiving increasing attention in the United States, North Africa and elsewhere. The simple covering in of the irrigation channels a method formerly recommended has not been found satisfactory. Although it shuts out sunlight and eliminates most aquatic growth certain aquatic fungi, bacteria and invertebrates are able to flourish and these permit the establishment of snail colonies.

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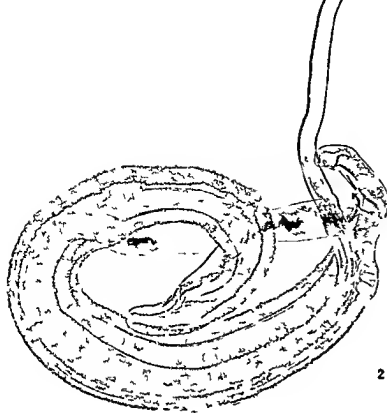
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manner in which immunity is acquired the nature of the stimuli causing resistance and the problem of inducing immunity

Of the three main species of schistosome which cause disease *Schistosoma japonicum* and *S. mansoni* are known to cause disease in other mammals as well as man *S. haematobium* (2) in the natural state rarely infects any other species but man and experientally many species are resistant but some primates the hedgehog and many rodents can be infected For obvious reasons of economy rapid breeding and manageability rodents are





the results of infection on them particularly on their powers of survival and their susceptibility to various chemicals and diseases under varying conditions. Taxonomic knowledge of both vector and parasite is incomplete and the gaps can largely be filled only in the laboratory. Some of the many problems that must be further studied in the experimental animal are the effects of various drugs on the schistosomes, the mode of entry of the parasites into the body and the distribution of the parasites and of their eggs in the tissues, the comparative effects of exposing the uninfected and the infected animal to large numbers of parasites, the acquisition of immunity to infection, the

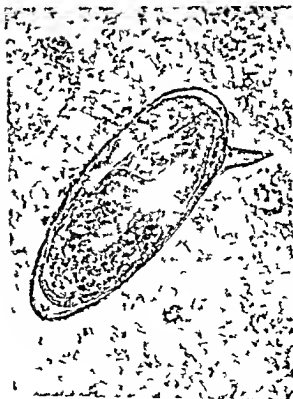
In the case of some other diseases the laboratory has provided answers to most of the biological problems that are raised by the host-parasite relationship. This is not the case with bilharziasis where the laboratory has still an important part to play. In respect of the intermediate hosts, for example, much remains to be learned and much can be studied in the laboratory on such questions as the rate of their growth and sexual maturation, the effects on them of physical and chemical changes in the water in which they live, the degree to which some species and strains resist infection by the parasite.





taken from the liver appears to be normal (3 left and 14) if killed later the outline is hazy and the worm is seen to be invested by phagocytic cells (3 right). Phagocytosis is a gradual process as can be shown (4) if worms are removed at intervals from the livers of infected mice undergoing treatment. Worms removed 18 hours after the beginning of treatment (A) are not as yet invested by phagocytes and look normal but they show reduced activity in Ringer's solution. In later specimens (B to E) investment with phagocytes gradually increases until it is complete and the worm is slowly digested. If treatment is stopped prematurely the worms although partially invested with phagocytes regenerate and migrate back to the mesenteric or vesical plexus to resume egg laying.

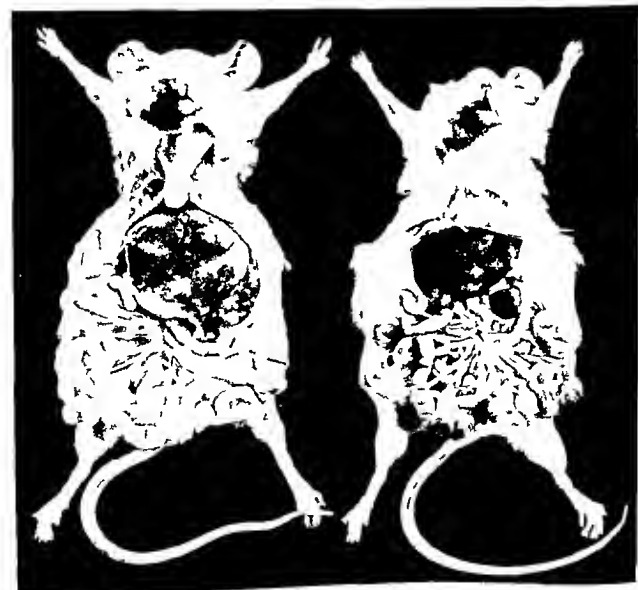
Dissection of a mouse 10 weeks after exposure to the cercariae will





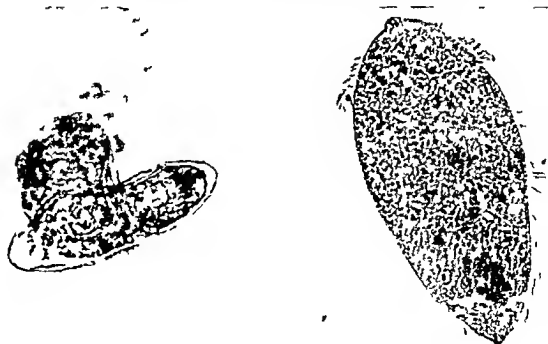
most used in the laboratory. They vary in their susceptibility to the disease the most susceptible species in general use being the albino mouse and the golden hamster. In the case of *S. mansoni*, the situation is the reverse: relatively few species are totally resistant experimentally. Again, however, the albino mouse and the golden hamster are the laboratory animals *par excellence* because of their extreme susceptibility and the high return of adult worms obtained from them.

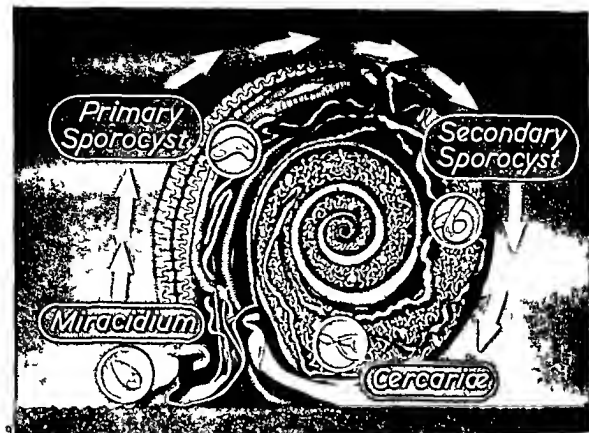
Before treatment with parasitocidal drugs the worms live mainly in the mesenteric or vesicular plexus of veins, the female enclosed in the gynaecophoric canal of the male. With treatment they relinquish their hold in the veins and are carried to the liver where they are attacked and gradually ingested by phagocytes. If the experimental animal is killed shortly after the beginning of treatment, the worm





show schistosomes in the mesenteric veins and a grossly enlarged liver and spleen (5). The presence of the worms in the mesenteric veins is indicated by the black pigment in the caeca of the females. The enlarged liver is studded with pseudotubercles formed by inflammatory tissue around eggs washed back in the portal blood; the spleen is also enlarged and infarcted (6 left). An uninfected mouse (6 right) has a





MOLLUSCICIDES IN THE CONTROL OF BILHARZIASIS

The schistosome parasite responsible for bilharziasis can be attacked at various phases in its complicated life cycle. For immediate result, however, attention has been concentrated on methods of keeping in check the aquatic or amphibious snails that act as intermediate hosts for the parasite. This in the opinion of the WHO Expert Committee on Bilharziasis is the most important single method of preventing bilharziasis¹.

There are various possible methods of controlling snails as well as by providing an unfavourable environment in an irrigation system. One is by the use of natural enemies or predators. Laboratory experiments have yielded valuable information about different species of animals which prey upon fresh water snails but conditions in nature are frequently different and not enough is known about the food preferences of these predators under natural conditions. Ducks for example were tried in the Philippines and found to be ineffective. Fish, toads, turtles, rats, crayfish and other snails have all been considered and some tried also without any apparent success. Even if a natural predator is found it may well be that as so often in nature its activities would merely result in fluctuations in the numbers of predators and prey rather than in eradication of the latter.

Another possible method is by introducing parasites or diseases which would kill the snails. Here there is some information available on the parasites and diseases and on their effects on snail numbers in this field investigations should continue as parasites and diseases are likely to be more specific in their action than natural enemies or predators. Snail colonies sometimes disappear for unknown reasons however and it may be concluded that much remains to be learnt about these vectors and about their habitats until more is known

these biological methods of control are more likely to be unsuccessful than otherwise.

Ecological methods of control have also been advocated. These include engineering methods to change the environment of the molluscan host and alterations in agricultural practices. The widening and straightening of water courses, alternate drying and flooding of channels, drainage of low areas along streams and cementing or covering of canals are all included in engineering methods. The cost of these methods is high but it could in some circumstances as at Leyte be to a great extent offset by the reclamation of the land and by increased production of rice and fish.

The most direct method of destroying snails is to treat their habitats with a chemical which is poisonous to them. The qualities desirable in a satisfactory molluscicide were enumerated in the first report of the WHO Expert Committee on Bilharziasis: "The chemical should at low concentration be toxic to snails and to their eggs in all stages; it should not be dangerously toxic to man, domestic animals or crops; it should not be easily inactivated by physical or chemical means; it should be cheap and it should be easy to handle"². Several thousand compounds have been screened for molluscicidal activity but only a few have been found which satisfy the majority of these criteria and none which can be considered ideal. A comprehensive list of the compounds with an appraisal of their possibilities will be found in the Expert Committee's report and the subject has been reviewed again recently in the WHO Bulletin⁴.

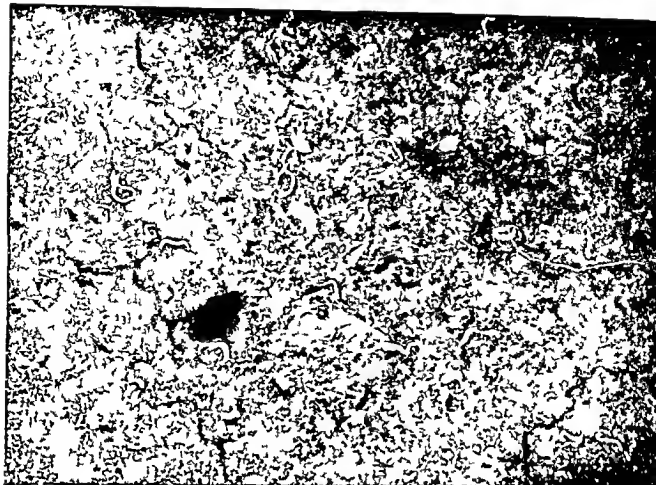
Compounds in use

Many metallic salts and organic metal compounds are lethal to snails in low concentrations but the majority of them are

See article on page 39

1. *Wld Hlth Org. techn. Rep. Ser.* 1953, 65, 33

2. *Parou E. (1958) Bull. Wld Hlth Org.* 18, 975



normal liver and the usual small spleen. Mice which have been infected 10 weeks previously are at a suitable stage of development of the disease for experimental chemotherapy.

Not all of the many eggs produced by the schistosome escape from the body. In the case of *S. haematobium*, for example, only those which are laid in the venules of the bladder succeed in making their way into the lumen and so into the urine. Those which remain in the tissues give rise, by the inflammatory reaction they cause, to the pathological manifestations of bilharziasis. The disease is nevertheless finally diagnosed by the presence of the eggs in the urine or faeces; the eggs of the three main species each being of a characteristic shape: thus the egg of *S. mansoni* (8) is identified by its lateral spine. Within the egg the ciliated miracidium may be visible (8) and motile. On contact with water the miracidium (13) hatches from the egg (12) and it then swims about, propelled by its cilia and contractile movements, until it dies or finds a suitable intermediate host: a freshwater snail which in Africa is most commonly of the species *Biomphalaria* or *Bulinus*; in South and Central America of the genus *Australorbis* (10); in the Western Pacific of the genus *Oncomelania*. Within the body of the snail the miracidium undergoes further transformations over a period of about six weeks (9), passing through primary and secondary sporocystic stages (11) until its descendants, some 100 000-250 000 cercariae, are ready to emerge from the pulmonary cavity of the snail into the water (7) and swim about, looking for a definitive host in which to complete their life cycle—a host which is still, in too many cases, man.

The World Health Organization acknowledges the valuable co-operation of the following institutions which have kindly made illustrations available for this article: Naval Medical School, National Naval Medical Center, Bethesda, Md., USA (1); Wellcome Laboratories of Tropical Medicine (2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14); Royal Society of Tropical Medicine and Hygiene (4).

behave as if they were amphibious and aestivate during the dry season NaPCP was found to be 100% effective in concentrations as low as 2 g per m² when applied immediately after the first heavy rain⁸ The significance of this finding is heightened by the fact that the few specimens that otherwise survive the drying up of their habitats in summer are able to repopulate the pools to their former density in 50-60 days⁹

When a molluscicide is applied to an aqueous habitat some of the snails may be protected from its action by the presence of vegetation or by sheltering in small bays while others may escape exposure by climbing out of the water or burrowing in the mud It is therefore advisable to remove dense vegetation before the application of molluscicide and to treat the banks of the water course as well as the water itself

Reinfestation

One of the greatest problems in snail control is the prevention of reinfestation As already mentioned a few survivors can repopulate a habitat to its former density in a few months But even if all the snails in a particular body of water can be annihilated there is always the risk that fresh ones will be brought in from an untreated habitat by animals or by aquatic birds

A further complication is that snails or their eggs may be washed down from the higher reaches of a stream or from the main feeder canal into waters that have been treated During a five year pilot project with NaPCP being carried out at Warraq El Arab in Egypt it was observed that reinfestation of the canals regularly commenced when they were reopened in February after the winter closure and again during the period of the Nile floods On each occasion reinfestation has been promptly controlled by treating the main intake the Sawahil Canal with

NaPCP and not a single snail has been discovered in the tertiary canals since the first treatment of the area in 1954 The success of these measures depended upon constant vigilance A surveillance team of four trained men searched the area continuously examining palm leaf traps placed throughout the canals and drains and frequently sieving the water with dip-nets A search is being made for simpler methods of preventing reinfestation

Chemical and mechanical barriers

In the Sudan the use of a chemical barrier to prevent reinfestation of irrigation systems has been tried After an initial application



*Khak drill bag ach co t m g app oxunat ly fi e
kl g ms f c ppe lf te suspended f m a steel
th p lleys t t h d across a can l utak f m
a ma canal Th g ad l las f th moll cd
m stuns a lethal co ent tion f a consider ble
t me o er a l gthv st t h of canal*

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Journal of Tropical Medicine and Hygiene

of copper sulfate in a concentration of 30 parts per million (ppm) continuous sulfation of the water is carried out at the exit from the main canal immediately before the inflow regulator giving access to the minor canals At this point the current is sluggish

W. G. H. W. H. Dobrovolny C. G. & Berry E. G. (1958)
Bull. Wildl. Hlth. Org. 18, 963

Barbosa, F. S. & Oliver L. (1958) Bull. Wildl. Hlth. Org.
18, 895

W. G. H. W. H. Dobrovolny C. G. & Berry E. G. (1958)
Bull. Wildl. Hlth. Org. 18, 963

too toxic to man and to domestic animals to permit their safe use. Copper sulfate is harmless however in concentrations that have a good molluscicidal activity and as it is also readily available it was one of the first compounds to be used on a large scale. It has been applied extensively in Egypt, Southern Rhodesia, the Gezira area of the Sudan and to a smaller extent in the Belgian Congo, Venezuela and Brazil.

Unfortunately copper sulfate suffers from two disadvantages. It appears to be ineffective against the eggs of the snails and it is rapidly inactivated by adsorption on mud and colloidal particles, particularly in alkaline water which precipitates the basic salt. This probably explains its transient action when applied correctly under favourable conditions; it will produce an immediate substantial reduction in the snail population but the colonies quickly regain their original size.

Of the newer compounds the halogenated phenols, their metallic salts, and the dinitro-alkylphenols have given the most promising results. Dinitro cyclohexylphenol proved very effective against *Oncomelania nosophori*, the molluscan intermediate host of *S. japonicum* in Japan. The vector snails of *S. monsoni* and *S. haematobium* are susceptible to the copper and sodium salts of pentachlorophenol. Sodium pentachlorophenate (NaPCP) has already been given extensive trials in Brazil, West Africa, Egypt and Puerto Rico and both the copper and the sodium salts are being used on a large scale for bilharziasis control in Venezuela. Besides being readily available and comparatively low priced these compounds have the advantage that they destroy the eggs of the snails and are lethal to the cercariae, miracidia and eggs of the schistosomes. Moreover they seem to be less readily adsorbed by mud and silt than copper sulfate so that their action is more prolonged.

Obtaining maximum efficacy

It is obvious that the method of application of the molluscicide can influence its efficacy and that the most suitable method will vary to some extent according to local conditions.

Trials carried out in Brazil in which many different forms of application were compared, showed that in general the application of the chemical in the form of briquettes or balls gave the best over all results in running water.⁵ Application in the form of a continuous drip was found useful under certain conditions and spray pumps proved valuable for treating the banks of streams and for dealing with snails marooned by receding waters during the dry season. Most other methods were not found to be advantageous and the application of NaPCP in the form of a dust was not considered advisable as it is a powerful respiratory irritant. However a form of NaPCP recently marketed is claimed to be non-irritating.⁶

Perhaps even more important than the method of application of the molluscicide is the timing of the application to coincide with that period in its life cycle when the snail can best be attacked. As the behaviour even of the same species of snail varies greatly from one region to another it is important that thorough ecological studies should be carried out on the spot before commencing molluscicidal operations. In the case of *Bulinus truncatus* for example reproductive activity is at a maximum in July/August in Morocco and in September in Iraq. In Egypt on the other hand there are two peaks, one in April and the other in October/November.

Another important consideration is that in some areas the snails hibernate in winter—for example during the winter closure of the canals in Egypt—while in others they aestivate when their habitats dry up in summer. It is of little value to apply molluscicides at these times but experience indicates that it may be most favourable to treat after reflooding of a dried habitat since reproduction of pulmonate vectors is generally rapid at that time the population is small and the snails may be immature.⁷ In Brazil where the molluscan hosts (*Australorbis glabratus* and *Tropicorbis centrimentalis*)

W. G. H. D. B. I. Y. C. G. & Berry E. G. (1948)
B. H. W. H. H. O. S. 18 963
P. I. E. (1958) B. H. W. H. H. O. S. 18 975
W. H. H. H. O. S. I. R. P. S. 1957 120

so that the snails remain for a longer time in contact with the molluscicide. A concentration of only 0.125 ppm is claimed to be sufficient to kill the snails and at the same time to help control the growth of the aquatic weeds on which the snail normally breeds. Similar experiments in certain Mediterranean countries and in Kenya have also given encouraging results.

The use of traps placed across the entrance to the irrigation system is also being tried in the Sudan. An L shaped trap consisting of two wooden frames covered with a fine mesh galvanized wire screen is used. It is immersed in the water with half the vertical frame projecting above the surface and the horizontal frame pointing upstream. The vertical portion catches vegetation and debris floating downstream while the horizontal portion prevents the material from being swept under the trap. It is claimed that the screen will hold up snails of all sizes and will also retain the eggs since the egg clutches are attached to vegetation which is caught by the screen. If the experiments are successful such traps will provide a simple means of preventing reinfestation of the canals and greatly cheapen the cost of control.

Results of field trials

A recently reported trial with copper sulfate is the WHO-assisted bilharziasis control project in the Qalyub area of Egypt.¹¹

¹¹ der Schai. EL (1953) *Bull. Wild. Hlth. Org.* 39: 63

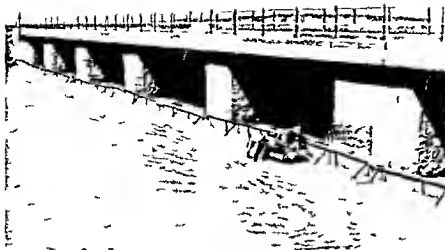
The quantity of molluscicide applied was calculated to provide a minimum exposure of 30 ppm throughout the irrigation system. Over a period of two years continuous surveys were carried out and fresh applications made whenever snails were discovered. Nevertheless it was found impossible to keep the vectors away from the area for long. Immediately after sulfation there was a very large reduction in the number of snails recovered in surveys but at the end of a year they were again abundant everywhere during the general spring survey nearly half as many *Bulinus* snails were collected as in the previous year (before sulfation) and the number of *Biomphalaria* snails was almost unchanged.

Results with NaPCP have been more encouraging. Reference has already been made to the five year pilot project at Warraq El Arab in Egypt. Three applications of NaPCP a year at a concentration of 10 ppm and prompt re-treatment of the main drain at the first sign of reinfestation have kept the irrigation system free from snails for a period of three years. Furthermore none of the snails recovered from the main canal during this time was found to be infected with *Schistosoma* and it is therefore assumed that no transmission of bilharziasis has taken place. The accompanying table shows the steady fall in the infection rates for *S. haematobium* and *S. mansoni* in schoolchildren since the operations started.

In the spring of 1955 this project was extended to the contiguous Zumor Canal system with the object of ascertaining to

PREVALENCE OF BILHARZIASIS INFECTION IN PRIMARY SCHOOLCHILDREN
IN THE WARRAQ EL ARAB AREA 1952-1956

Y	Schistosoma haematobium			Schistosoma mansoni		
	No. infected	No. positive	Percentage	No. infected	No. positive	Percentage
1953	1447	58	4.02	1437	27	5.0
1954	1522	92	3.83	95	110	4.4
1955	1714	64	3.7	2507	79	3.0
1956	2720	713	26.2	1079	12	1.9



A general view of a mechanical trap designed to relieve pressure upon the chemical barrier. It consists of a series of fine mesh galvanized iron screens fitted to rails stretching across the canal and is cleared periodically by a worker who counts the snails caught in the debris before burning them.

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Dr. Had El-Naggar, author of
"The Plague in Egypt"



A closer view of a snail trap on a smaller canal. The principle used is the same as in the picture above.

THE LEYTE BILHARZIASIS PROJECT

Bilharziasis due to infection with *Schistosoma japonicum* was first reported from the Philippines in 1906. Although sporadic studies of the disease were made there during the succeeding forty years little was done towards the institution of control measures. Research was given fresh impetus however by outbreaks of bilharziasis which occurred in 1945 among American and Australian armed forces stationed on the islands. It soon became apparent that the problem was of considerable magnitude and the Philippine Government decided on prompt action. In 1951 a Division of Schistosomiasis was created within the Department of Health and the following year the Government requested WHO to send a team of consultants to study the bilharziasis problem in the Philippines. The team recommended the concentration of funds and efforts on a pilot project of 3-6 years duration to be carried out in parts of the island of Leyte which appeared to be the most important endemic area.¹

The Philippine Government acted quickly on these recommendations and with the assistance of the Foreign Operations Administration of the USA and the Philippine Council for United States Aid a fully equipped project building including laboratories was constructed and staffed. Three members of the project staff were experts provided by WHO. By June 1953 the project was ready to start functioning officially.

Synopsis of the project

Until 1953 bilharziasis in the Philippines had been attacked almost entirely by medical methods. There is little evidence however that drug treatment can play a significant part in the control of the disease except perhaps in the final stages of a campaign. In Egypt it has already been practised for years without significantly affecting the

prevalence of bilharziasis there. Not only is cure uncertain but reinfection almost invariably occurs. Moreover most bilharziasis patients are undernourished and have two or more other helminthic infections as well—a situation that militates against the successful use of the drugs at present available.

The cycle of infection must therefore be interrupted at some point outside the human host. The principal aims of the project were to find answers to the complicated biological and social problems that this involves.

Man contracts bilharziasis through contact with waters harbouring infected vector snails and the snails become infected because their habitats are contaminated by human or animal excreta containing schistosome eggs. The provision of latrine facilities would thus appear to be a suitable method of control but before the value of this measure can be decided it is necessary to know the relative importance of man and of animals as reservoirs of infection. An epidemiological survey conducted by the project team indicated that humans are the main source of infection in the area. However an attempt to provide latrines for the entire population of one village revealed the difficulties of such an undertaking. Apart from the considerable cost of the scheme the team encountered great reluctance on the part of the population to use the facilities provided.

An approach that would eradicate bilharziasis if it could be successfully applied is elimination of the vector snails. This is not as simple as it might appear at first sight however. Molluscicides are never 100% effective and the survivors rapidly repopulate the habitat. It is necessary to bring about some permanent change in the habitat that will render it incapable of supporting a snail colony. But the factors that make one stretch of water suitable for snails and a neighbouring one unsuitable are elusive.

what extent a single treatment of a large primary canal with NaPCP would control snails throughout the area it serves. It had already been observed in the Warraq El Arab trials that a concentration of 10 p.p.m. of NaPCP was maintained for a distance of 22 km—the total length of the Sawahil Canal—and that six weeks after application a residual of 10 p.p.m. was still present in irrigation drains. In the Zumor Canal project the molluscicide was introduced into the primary canal (the Giza Canal) at a point 14.5 km from the intake of the Zumor Canal; ten hours later a concentration of 10 p.p.m. had reached the secondary canals and after seventeen hours the concentration at a point 30 km from the point of application was still 10 p.p.m. Unfortunately temporary dams thrown up by farmers and certain other factors such as the direction or velocity of flow prevented a few of the secondary and tertiary canals from receiving an adequate dosage. With these exceptions however complete eradication of the snails was obtained throughout the entire system involving 1800 km of canals and drains.

A team similar to that which was responsible for these two trials in Egypt has also demonstrated the efficacy of NaPCP against *Australorbis glabratus* and *Tropicorbis centralis* in Brazil¹². Although a single application failed to kill the entire snail population in every stream, no living snails were found for a period of 2 months in 75% of the streams where the concentration and dispersion of the chemical were adequate. In some of the streams freedom from snails was maintained for periods up to 12 months and in 40% of the streams surveys conducted after 4 months showed that the snail population was still less than 10% of its initial size. It must be remembered that these were only preliminary trials designed to provide information on the required dosage, exposure time, most feasible methods of application etc. Consequently the methods used were not always the most efficacious ones.

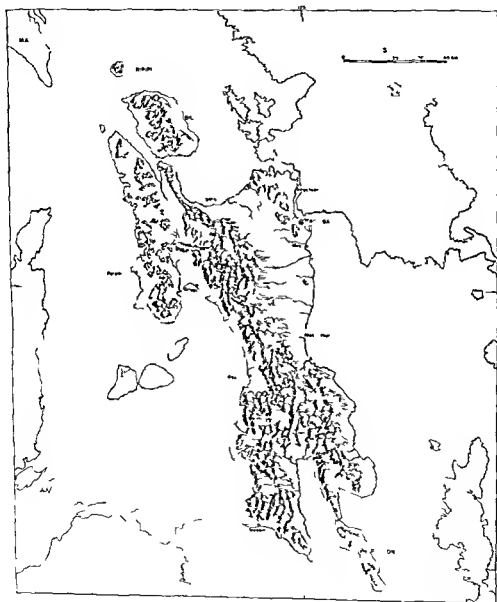
Cost

In considering the cost of snail control operations the long life of the schistosome parasite in the human host has to be borne in mind. Even if all the snails in a particular area were eliminated a human reservoir of infection would remain for several years and throughout this period snail control measures would have to be continued to prevent reinfestation. On the other hand the cost must be balanced against the economic advantages arising out of the improved health of the community. Van der Schalie¹³ estimated the cost of copper sulfate treatment of approximately 300 km of canals and drains in the Qalyub area of Egypt at \$14,200—a figure which he considered prohibitive. In the Warraq El Arab project which covered a population of 50,000 the cost of NaPCP used for 182 km of canals and drains was \$4147. The team estimated that copper sulfate treatment applied only to those sections of the system where snails were found would have been almost twice as expensive. It would seem that if NaPCP is applied in the most effective manner its use on a large scale for the control of snails in irrigation systems will prove a practical and economic proposition particularly if it can be used in combination with suitable barriers to prevent reinfestation of the canals. But this presupposes that before major programmes are undertaken adequate studies are carried out on the ecology of the molluscan intermediate hosts, the nature of the terrain, the physical features of the water course and the types of vegetation. Only when all this information is available is it possible for the application of the molluscicide to be correctly timed, the dose rate/time factor to be accurately determined and the appropriate method of application to be selected. It is the aim of WHO to encourage this methodical approach to the use of molluscicides while at the same time sponsoring basic research on snail ecology that may lead to new methods of control.

Wright W. H. D. & Berry E. G. (1958)
Bull. Wildl. Hlth. Org. 18: 963

Van der Schalie, H. (1958) Bull. Wildl. Hlth. Org. 19: 63

FIG 1 RELIEF MAP OF LEYTE PROVINCE PHILIPPINES



On the other hand such drastic measures as draining or filling in habitats may prove too expensive to be applied on a large scale. For these reasons the project team undertook a comprehensive ecological study of the snails designed to reveal the most vulnerable stages in the life cycle and the principal factors in the environment on which the continued existence of the snails depends. An investigation was also made into the exact part played by the snails in the transmission of the disease with particular reference to the effect of rainfall temperature sunlight etc on their infectivity.

Although measures designed to change the habitats of the snails are expensive they may become economically feasible if they can be made to yield some other return such as improved use of the land for agricultural purposes. This aspect of control was also investigated by the team with very promising results. It was found for example that improved methods of rice farming would not only greatly reduce the snail population of the rice fields but also double the yield of rice.

The data assembled from these studies will enable a systematic approach to be made to the problem of bilharziasis control in the Philippines and at the same time provide a base line for the future evaluation of the progress achieved. Furthermore the project may well serve as a model for other countries facing the problem of bilharziasis control although the results are not necessarily transferable directly to other areas where the vector snails and the environmental and social conditions may be different. The approach is universally applicable.

The project areas

The island of Leyte lies at the centre of the Visayan group of islands in the Philippines. Of the island's total area of approximately 2800 square miles (7200 km²) nearly 75% consists of rough mountain and rolling upland (Fig 1). To the north east however there is a long stretch of plain constituting about one sixth of the total area of Leyte. This plain is crossed by

numerous perennial rivers which often flood in the rainy season the soil drains poorly resulting in vast swampy areas. The climate is warm and humid with abundant rainfall throughout the year. Conditions are favourable for the development of vector snails and bilharziasis is endemic in this area. By contrast western Leyte which is slightly drier and is well drained is free from the disease.

The main areas selected for the project lie around Palo and the neighbouring municipality of Tanauan with the headquarters at Palo 12 km south of the capital city of Tacloban. Conditions there are being compared with those at Carigara on the northern coast which was originally thought to be entirely free from bilharziasis. Some caution may be necessary in interpreting the findings however as a few cases of the disease were discovered there during the survey. Following completion of the preliminary studies it is intended to institute an energetic programme of community development in the newly opened up area of Bagahup 30 km north of Palo. This programme will incorporate all the methods of control which have been developed.

Poblaciones and barrios

Each of the four localities mentioned above constitutes a municipality of which there are 60 in the whole province of Leyte. Each municipality consists of a central area known as the poblacion surrounded by 10-20 barrios or villages. The poblacion is urban or semi urban in character and includes the municipal offices church market place school and health centre. It accounts for about 20% of the total population of the municipality. The barrio is the smallest recognized unit and constitutes the primary social group.

Until 1954 many municipalities were without health or medical care and such services as existed were limited mainly to the poblacion the barrios received almost no benefit. Under the new Rural Health Act passed in 1954 the position of provincial health officer was created and a municipal

TABLE 1 SUMMARY OF CENSUS DATA FOR PALO TANAUAN CARIGARA AND BAGAHUPI

Yow	N mb f h	N mb f faml	P p l to	N mb of p ho	P p l to % y	P p r p f m l s	M l n o c p a t l	N m b e of a l m a l p r h s	P a e t a of h f t r
P	283	2876	14819	52	53.0	93.100	P ¹ f a m r s W m h k i d l a b h k i d	27	503
Ta	2707	2743	12061	45	50.2	93.100	M f m s a n h e m o W m h k e p o g	35	508
C lo	2857	2703	15346	54	55.0	93.100	M f m f n s h m W m h k e p o g	26	51
B o h p	142	143	582	58	58.7	108.100	F m s d l b l	23	141

tained by choosing individuals from every tenth or every fifth house in the community

Stool examinations were carried out on 5-cm³ specimens within three hours of collection using a combination of the following techniques

1 One direct faecal smear (2 cover slip preparations)

2 Glycerol sedimentation using 0.5/ glycerol in tap water and examination of the entire sediment

3 Hatching the eggs in the sediment from 2

4 Examination of the sediment from 3

This standard method was found to be superior to other methods tried with the exception of the MIFC (merthiolate iodine formaldehyde concentration) technique which was also used in some circumstances. However the standard method has the advantage that it allows observations on the viability of the eggs and that it can be performed away from an equipped laboratory as it requires fewer chemicals and no centrifuge. For quantitative determinations of the number of eggs in the stools two methods were used: the Stoll technique with 3 ml of faeces and the MIFC egg count in total sediment using 1 ml of faeces. The Stoll technique was found more efficient for counting the eggs of intestinal helminths whereas the MIFC technique was superior for schistosomiasis.

The reliability of the intradermal test previously used in mass screening surveys for *S. japonicum* infection was also evaluated. The results showed that although the test does not provide evidence of active infection with bilharziasis it is of value as a rapid screening method. The degree of sensitivity increases with age. Infection in children may therefore be missed but in adults up to 90% of cases can be detected.

Prevalence of bilharziasis in the pilot areas

Of the total of 2909 persons examined in the Palo area 48% were found to be infected with bilharziasis. As can be seen

health officer was appointed for each municipality. Preventive and out patient care are now under one health unit consisting of a physician, public health nurse, midwife and sanitary inspector. By 1956 39 fully staffed health units were in operation in Leyte and complete coverage was planned for 1958. Unfortunately attendance at the rural health centres has so far been small in comparison with the population served. Plans are being made for the municipal health officer to hold clinics at suitable centres in the barrios by rotation each week. According to the 1954 annual report of the Leyte Provincial Health Officer 95.5% of deaths in Leyte occur unattended by a physician. The people of the barrios believe that illnesses are caused mainly by evil influences and have much faith in the local *herbolarios*.

Living conditions

The population of Leyte has been increasing at the rate of about 2% per year for the past half century and the population density is now nearly 325 per square mile (125 per km²). Housing is extremely simple and nearly all houses are constructed of locally available materials such as bamboo, nipa palm and cogon grass. To avoid floods the houses are set on stilts. Only about 12% of the population have latrine facilities of any kind. The rest of the barrio people defecate in the open, pigs often acting as ready scavengers. There is no system of drainage anywhere, even in the larger towns there are only concrete surface drains which become stagnant cesspools and breed mosquitos. The situation is made worse by the heavy rains and by the decaying vegetation which surrounds the houses. But in spite of these unhygienic conditions the people are remarkably clean, changing, washing and ironing their clothes with great frequency even in the remotest barrios. Water is usually obtained from sanitary dug wells or improved springs. These supply 55% of the population. Only 22% have piped water or water from artesian wells while 23% have water from unprotected sources.

The census

A complete census was undertaken in the four project areas of Palo, Tanauan, Carigara and Bagabup, which were each subdivided on the basis of apparent topographic and demographic differences into three divisions: the poblacion, the coastal division and the inland division. The information collected included the total population with age and sex composition, the number of houses and the number of families. From these figures it was possible to calculate the number of persons per house, the percentage of the population under 20 years and the proportion of males to females. Information was also collected on the main occupations, the number of animals per house and the number of houses with latrines. A summary of the data will be found in Table 1.

To permit an assessment of the part played by animals in the transmission of bilharziasis a census of the animal population was also taken. On the average there were nearly three animals per household. In all three divisions of Palo and in the coastal and inland divisions of Tanauan there was approximately one pig to each house and one dog to every other house. In the poblacion of Tanauan there were roughly three pigs and one dog to every house. Carabaos (water buffalo) averaged about one to every two houses in Palo and three to every four houses in Tanauan. Cats were in almost the same proportion. Goats, cows and horses were kept much less frequently, especially in Tanauan. Attempts to determine the rodent population were unsuccessful but on the basis of experience in comparable areas elsewhere a figure of ten rodents per person seemed a reasonable working assumption.

Techniques

For the studies in Palo and Tanauan approximately 20% of the population in each age group was selected so that the age structure of the sample was the same as that of the total population. At Carigara and Bagabup random samples were ob-

TABLE 1 SUMMARY OF CENSUS DATA FOR PALO TANAUAN CARIGARA AND BAGAHUPI

Tow	N mbe f h s	N mb f i m l	P p i t	N mb f p h	P f p p i t o 20 y	P p r t f m l to f m l s	Mai c p tio	Number f im is per h s	P nt g of h with i l l es
Pai	2 832	2 876	14 819	52	530	93 100	M f m r killed b W m h s k epl o	27	503
T	707	2 753	12 081	45	60	10 100	M f m s q h m o W m n hou ne p i o	35	208
C i g	2 057	2 023	15 348	54	50	97 100	M n f m c p m W m h u s k p i o	20	51
Bag h p	14	143	0	8	487	106 100	F m s s d i b l s s	3	141

tained by choosing individuals from every tenth or every fifth house in the community

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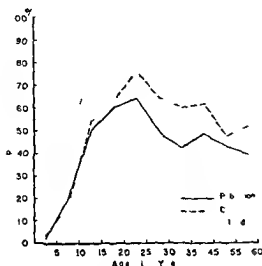
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FIG 2

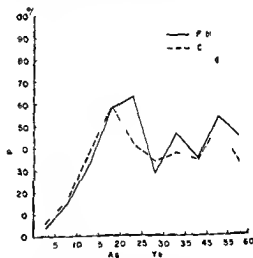
AGE PREVALENCE OF SCHISTOSOME INFECTION
IN THE THREE DIVISIONS OF PALO 1953-54

from Fig 2 the infection builds up rapidly during childhood and adolescence reaching a peak in the age group 20-24 years with a prevalence rate for the whole area of 71.1%. Significant differences were observed between the poblacion the coastal division and the inland division. In the inland districts prevalence increases more rapidly with age and the peak is reached in the age group 15-19. The higher prevalence is maintained throughout all the age groups. The poblacion and the coastal areas do not differ appreciably with regard to age prevalence until the peak is reached at 20-24 years but thereafter the coastal division occupies an intermediate position between the inland division and the poblacion. These differences can be explained partly on the basis of environmental factors partly on the basis of occupation. The inland division has the poorest sanitation of the whole Palo area and the housing and living conditions are also backward compared with the other two divisions. The poblacion in turn has a more urban character and better sanitation than the coastal division. The occupations that bring people most in contact with infected waters are farming and inland fishing. Seagoing fishing brings less risk of infection. The population of the poblacion

is made up mainly of small businessmen municipal employees farmers and a few carpenters in the coastal division the main industry is fishing combined with some lowland rice growing while in the inland division lowland rice farming is the main industry.

The prevalence of bilharziasis in the Tanauan area was very similar to that in Palo of 2246 persons examined 46.3% were found to be infected. The age prevalence rates (Fig 3) also show the same general trends as those for Palo but the initial rise is much steeper and the peak is reached sooner (in the age group 10-14 for the whole area).

FIG 3

AGE PREVALENCE OF SCHISTOSOME INFECTION
IN THE THREE DIVISIONS OF TANAUAN 1953-54

The difference between the inland division and the other two divisions is again well marked but the poblacion and the coastal division have very similar age prevalences. This is explained by the fact that in Tanauan the poblacion is itself situated on the coast. The occupational differences observed in Palo were also found in Tanauan.

As already pointed out Cargara was originally included in the area in the belief that it was entirely free from bilharziasis. In fact no cases were detected among the 500 people examined in the poblacion but

9 were found in the coastal barrios and 35 in the inland barrios out of 1156 persons examined. The total of 44 cases represents a prevalence of only 2.7% and it is not certain whether these were indigenous cases or imported into Cangara from neighbouring areas in the endemic valley. At all events Cangara can be regarded as at least a hypoendemic area and with due precautions the findings there can be used to throw light on some obscure points in the epidemiology of the disease in Palo.

In the barrio of Bagahup, the only known endemic area north of Tacloban 177 persons were examined and an overall prevalence rate of 43% was found with a maximum of 69% in the age group 20-24 years. Rates were highest (over 50%) in farmers, tuba gatherers and the jobless.

Prevalence of common helminthic infections

The high prevalence of common helminthic infections in hot countries often masks the epidemiological features of bilharziasis and makes it difficult to assess its public health significance. The team therefore deemed it useful to search for other intestinal worms at the same time as the stools were examined for schistosome eggs.

In all four of the pilot areas infection with one or more of the three common parasites—*Ascaris Trichuris* and *Ancylostoma*—was found to be present in 98.99% of the persons examined. As might be expected *Ascaris* and *Trichuris* infections were acquired at an early age and the prevalence of both diseases attained a peak of over 90% in the age group 5-9. Subsequently the prevalence of *Ascaris* infection showed a downward trend whereas that of *Trichuris* infection remained constant through all age groups. *Ancylostoma* infection had a relatively low prevalence in early childhood but about 70% of children were infected by the age of 10-15 years and the prevalence continued to increase slowly with advancing age. Despite the differences in living conditions and sanitation between the poblacion, the inland and the coastal divisions of the municipalities there were no marked differ-

ences between them with regard to the prevalence of helminthic infections. The conclusion was drawn that although proper sanitation is of undoubted value in preventing the spread of helminthiasis "pin point" sanitation can have little effect when the sanitation elsewhere in the area is of a low order. This does not mean that improved sanitation however limited in scope should not be encouraged.

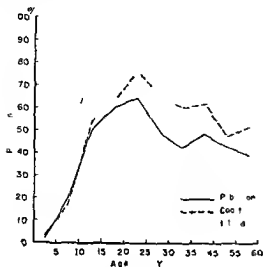
The public health significance of bilharziasis

In 1953 the WHO Expert Committee on Bilharziasis² pointed out that the proportion of persons infected with *Schistosoma* who show clinical signs of the disease appears to vary considerably from country to country and that the cause of these variations is not at present thoroughly understood. In the Leyte project an attempt was made to obtain a fairly accurate assessment of the amount of disease and disability caused by *Schistosoma* infection. This was by no means a simple undertaking. As already pointed out 95.5% of deaths in this area occur without medical attendance. Cause of death statistics are therefore valueless. The only possible approach was through morbidity studies and as the main object was to establish the degree of disability the following classification was decided on.

- I *Mild* occasional abdominal pain occasional diarrhoea or dysentery no absence from work
- II *Moderate* as I but with anaemia or weakness inability to do hard work
- III *Severe* as II but with recurring attacks of diarrhoea and dysentery frequent absences from work
- IV *Very severe* as III but with ascites or emaciation or both total inability to work

On the basis of a preliminary pilot study a 20% sample was selected from all stool positive cases in the Palo area the selection being made by reference to a table of random

FIG 2
AGE PREVALENCE OF SCHISTOSOME INFECTION
IN THE THREE DIVISIONS OF PALO 1953 54

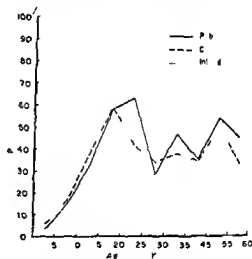


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accurate estimate of liver size the team divided the abdominal wall between the costal margin and the umbilicus into six segments by two horizontal planes—one midway across the epigastrium and one at the level of the pylorus—and by one vertical plane passing through the umbilicus.

The liver size was denoted as 0.5 if it projected into one segment as 1 if it projected into two segments and so on. No livers projecting below the umbilical plane i.e. larger than size 3 were found. The liver rate—percentage of livers palpable below the costal margin—was highest in the age groups 5-9 and 10-14 (78 and 67 respectively). From 15 years of age onwards the rate remained between 20 and 30. Liver size reached a maximum in the 10-14 years age group. No significant differences were found between males and females either with regard to liver rate or to liver size. The liver rate in the coastal division—the division with the highest percentage of mild cases—was significantly lower than in the inland division or the población. The results suggest that in spite of the presence of many complicating factors there is a definite correlation between hepatomegaly and the severity of bilharziasis infection.

Incidence of bilharziasis in the age-group 5-9

Data on prevalence—the percentage of the population exhibiting infection at a given time—do not reflect differences between diseases with a high incidence but a short duration and those with a low incidence but a long duration. On the other hand changes in incidence provide a sensitive index of the efficacy of control measures. For this reason the team also undertook a "longitudinal" study on children in the age group 5-9 years to determine the actual incidence of bilharziasis.

The study was made on a random sample of 200 children taken from a group of 407 children who had been found to be free from bilharziasis during a prevalence survey two years previously. In the course of house to house visits physical examinations haemoglobin estimations eosinophil counts and

stool examinations were made. The mothers of the children were also interviewed. A child was regarded as negative on the basis of three consecutive negative stool examinations by the MIFC technique. The study showed that 70 children had acquired the infection during an average time interval of 22 months giving an annual incidence rate of 20.4%. The incidence in the población was 12% in the coastal division 11% and in the inland division 46%. Moreover in the inland division 32% of the new infections were in children under 7 years old compared with 13% in the población and 8% in the coastal division. This is in accordance with the varying opportunities for infection provided by the different environments as already reflected in the finding on prevalence.

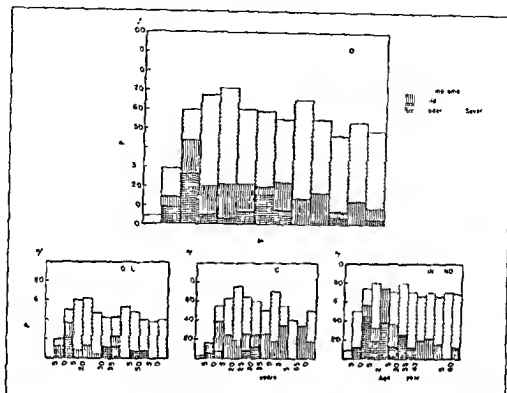
Transmission of *S. japonicum* infection

Many domestic animals and other mammals have been shown to be capable of harbouring *S. japonicum* so that the parasite has a wide choice of hosts in nature. In order to develop a rational control programme it is necessary to know the relative importance of the different reservoir hosts in the transmission of the disease.

The seven mammals known to be concerned in the transmission of bilharziasis in the Leyte area are man pigs dogs carabaos cows and rats. The numerical strength of each of these hosts was already known from the census conducted at the beginning of the survey. By examining stool samples the team determined the prevalence rates for the various hosts the mean daily egg output and the hatchability of the eggs—the percentage of eggs producing miracidia. The product of the mean daily egg output and the hatchability gave the mean daily production of miracidia and when this was multiplied by the number of persons or animals infected a "transmission index" was obtained. The results are shown in Table 2 the last column of which gives the relative transmission index calculated as a percentage. Although around 10 times as many eggs per day are produced in dogs cows and carabaos as in

FIG 4

CLINICAL GRADIENT OF SCHISTOSOME INFECTED INDIVIDUALS IN PALO AND ITS THREE DIVISIONS



numbers. The persons so selected were visited in their own homes by two members of the project team who made a careful record on a standard form of the past and present history and the findings of physical examinations. Haemoglobin was determined and a box left for the collection of a stool sample the following morning. With a few exceptions co operation was excellent.

Of the 278 infected persons examined 105 showed clinical evidence of bilharziasis but none of these cases were classified as very severe and only 4 as severe. More than half the cases (60) were classified as mild and the remaining 41 as moderate. In terms of the total population this would mean that 10.3% have mild symptoms, 7% have moderate symptoms and 0.7% have severe symptoms. Clinical symptoms were found to occur most commonly between the ages of 10 and 14 in this age group 73% of the infected children had manifest symptoms referable to bilharziasis

and the proportion of moderate and severe cases was also higher than in the other age groups. No significant sex differences were found. These results (Fig 4) show clearly that children in the 10-14 years age group bear the brunt of the disease and that a large proportion of infected persons are able to live in a state of natural balance with the parasite without any profound disturbance in their normal life.

Hepatomegaly

As liver enlargement is very common in the area even in the absence of bilharziasis it could not be used as an index of the severity of the disease. Nevertheless it is in the liver more than in any other organ that pathological changes are to be found in bilharziasis caused by *S. japonicum*. A separate record of liver enlargement was therefore made in all cases where physical examination was not refused. To obtain an

time. A certain amount of water and a relatively undisturbed situation appear to be necessary for the snails to thrive. But there are some places that apparently have the necessary moisture, topography and vegetation yet do not support snail colonies. Soil and water analyses failed to reveal any consistent differences between these areas and those that supported snails nor could any regular differences be found in the fluctuations in water levels.

Habits of *O. quadras*

In order to obtain a complete understanding of the ecology of *O. quadras* the team made a detailed study of its behaviour and activity. Observations were carried out continuously over 24 hour periods: copulation, movement and climbing were observed in the field and feeding and egg laying in the laboratory. The areas for observation of movement were marked out by means of metal frames 18 cm square placed on the ground at three different sites in the colony. The sites were so chosen that not more than 10 snails were included within any one frame. For observations on copulation larger areas 50 cm square were staked out. All forms of activity were greater at night than during the day and thus applied especially to copulation. The percentage of snails copulating was highest at 10 00 p.m. (52%) and lowest at 10 00 a.m. (14%). The pattern of activity was affected by the weather however and on a rainy afternoon 43% of the snails were observed in copula as early as 2 00 p.m. normally the time of least activity. From observations on the duration of copulation it was computed that on the average snails copulate once a day.

The influence of humidity, temperature, light and atmospheric pressure was investigated more closely under laboratory conditions. It could be easily demonstrated that the reaction to light is one of avoidance. During the day this would produce considerable horizontal movement as the snails crawl in search of shade but would restrict climbing, an effect that would be reinforced

by the lower humidity away from the surface of the mud. At night increasing humidity would more or less counterbalance the effect of darkness and lowered temperature and at the same time encourage climbing and copulation. Similar considerations may account for the seasonal differences observed for example that copulation is less frequent in June when the weather is dry and the days are long than it is in September the beginning of the rainy season.

Another observation was that the snails laid nearly three times as many eggs at night as during the day. On the other hand feeding was more rapid during the day than at night. It would appear that the activities that are more pronounced at night are those relating to reproduction, climbing probably representing a form of mate seeking.

The team concluded from several series of observations that about 88% of the eggs laid by snails are hatchable but the mortality of the young snails is high, less than 20% surviving to adulthood. When they first emerge the snails are aquatic and during the first two weeks of their existence spend most of their time below water. More than half of them die during this aquatic stage.

Density of snail colonies

Changes in the density of a snail population and in the age and sex structure provide a ready index of the efficacy of control measures and of whether or not active breeding is taking place.

To obtain an accurate estimate of the density a large number of small samples must be taken scattered as widely as possible over the area. The routine method of sampling used by the team was to decide in advance on a pattern of evenly spaced sampling sites and then to drop a metal ring 13.5 cm in diameter over each of these sites. All the snails that could be found within the ring were picked up with forceps and placed in a numbered envelope. At least 30 samples were taken before drawing conclusions about the population. The method of ring sampling is impossible however where the water is more than 5 cm deep and it is

TABLE 2 RELATIVE TRANSMISSION INDEX OF DIFFERENT HOSTS OF SCHISTOSOMA JAPONICUM IN PALO

Host	Population	Prevalence (%)	Mean daily egg output	Hatchability (%)	Mean daily miracidia produced	Transmission index	Relative transmission index (% of total)
	A	B	C	D	C x D	$\frac{(A \times B) \times (C \times D)}{(C \times D) \times}$	$\frac{(A \times B) \times (C \times D)}{(E)} \times 100$
Human	14 819	48.0	1 123	4.4	476	33 5 845	75.7
Dog	1 517	18.2	13 106	17.8	2 333	644 127	14.4
Cow	76	38.2	12 212	71.9	8 780	254 901	5.7
Pig	3 193	13.3	481	31.9	153	64 974	1.5
Rat	148 190	22.7	21	10.6	2	672.8	1.5
Carabao	1 318	1.5	9 166	29.4	2 695	53 280	1.2
Goat	204	1.4	952	71.4	680	1 942	0.04
						Total (Σ)	
						4 472 347	

Estimated number of 10 rats per person which equals 60 rats per hectare

humans the hatchability of the eggs from dogs and carabaos is relatively low. More over there are only 76 cows in the whole Palo area. Consequently the transmission index for man is more than 5 times that for the dog, more than 13 times that for the cow and more than 50 times that for any of the other mammals. It is thus clear that humans constitute the main source of infection in this area. An analysis of the figures for the human population by age groups showed that almost 60% of the total infection comes from children aged 10-14 years, the age group which had already been shown to bear the main brunt of the disease. The findings demonstrate the importance of the sanitary disposal of human faeces and the need to concentrate medical care and public health measures on the age group 10-14. At the same time it is evidently essential to keep a check on the cow and dog populations in the endemic areas.

The snail vector

In 1932 Tubanguil identified the intermediate host of bilharziasis in the Philippines as *Oncomelania quadrasi*. Although snails of the genus *Oncomelania* act as intermediate

host for *S. japonicum* in several countries of the Western Pacific area, the species *O. quadrasi* has not so far been reported outside the Philippines. Even here its distribution is very limited and it appears to be confined almost entirely to the islands of Mindanao and Samar and to eastern Leyte. These are all characterized by the absence of a dry season. Most of the snail habitats are found near sea level but whatever their elevation they are always very flat, a feature that makes for retention of water.

In all the areas inhabited by *O. quadrasi* there occur meandering sluggish streams densely populated with snails, numerous small swamps formed by seepages or springs emerging at the foot of high steep banks also support snail colonies. Both the streams and the "swamps" are used for fishing and as carabao wallows. During road construction work, rather large ditches are often left at the sides of the road and these too provide good habitats for *O. quadrasi*.

A comparison of the various habitats of *O. quadrasi* reveals some striking differences but one feature they all have in common is that they never dry out for any length of

repeated disturbance of farming might well hasten the disappearance of snails and further reduce the cost of maintenance."

Shedding of cercariae by infected snails

It had previously been reported that the shedding of cercariae by infected snails kept in the laboratory is cyclic in nature. Using a millipore filtering apparatus the team was able to make counts of the number of cercariae per 0.1 m² on the surface of the water in a natural snail habitat. Observations at four hourly intervals showed a peak density at 11.00 p.m. at one site and at 7.00 p.m. at another. At both sites the minimum concentration was observed at 3.00 p.m. Repetition of the experiment at a later date when the snail infection rate had decreased considerably showed that although the average cercarial density was correspondingly lower the peak period remained unchanged. Evidence was also obtained on another occasion that rainfall stimulates the shedding of cercariae. The risk of contracting infection from snail infested waters is therefore greatest in the evening and particularly after rain.

When planning bilharziasis control measures it is important to know how far the cercariae can travel downstream away from the snail colonies. Tests carried out by the team indicated that at a site in the Malirong river 150 m downstream from the nearest snail colony the concentration of cercariae was almost as great as in the colony itself at least in midstream. More surprising still a pair of flukes were recovered from a mouse that had been placed in a floating cage in the Palo river at a point separated from the nearest colony by a waterfall 1.5 m high and by a kilometre of moderately flowing river. It is likely that the cercariae were released by an infected snail that had been carried downstream but the team concluded that no fresh water downstream from any snail colony can ever be considered safe.

Snail control

The theoretically most effective way of attacking the problem of bilharziasis is to

eliminate the colonies of vector snails or at least to keep them in check. Methods of achieving this can be broadly divided into chemical and physical. Chemical methods—the use of molluscicides—are most suitable for clearing up small pockets of snails that remain after the main campaign has been completed. Physical methods—drainage, clearance of vegetation etc.—are expensive but they can be made to yield other benefits as well such as the reclamation of swampy land and increased crop yields due to better farming methods. These were the main considerations that guided the team in its search for economic methods of control that would be suitable for application in Leyte.

Two experiments were conducted on the value of removing vegetation. The first snail colony selected was on the banks of a stream 260 m long and 1.2 m in average width. The bed of the stream and about 5 m on either bank were cleared of vegetation for lengths of 30–40 m. Alternate lengths were left uncleared as controls. A 34% reduction in the snail population was achieved in the cleared areas whereas the uncleared areas showed an overall increase in snail density. However maintenance clearing had to be carried out five times during the nine months of the operation, a serious disadvantage of this method. The results were nevertheless considered sufficiently encouraging for the team to try a more thorough clearance experiment on a larger scale. The Binangkawan stream, a tributary of the River Palo, was cleared for its entire length of 426 m. In addition to cutting the vegetation many roots were removed, the stream was also channelled and its banks were made vertical to render them less attractive to the snails. This procedure resulted in a reduction of 48% in the snail population. During the first 8 months the vegetation was removed twice and control was satisfactorily maintained. For the next 8 months the stream was left untended and the population returned to its original density but there was a renewed fall when a third maintenance clearing was carried out.

An adjacent snail colony in the Kanbanwa valley was considered to be a suitable area for an experiment in drainage. The colony

unsatisfactory for collecting young snails. In some instances therefore the team adopted the method of tube sampling although this takes about ten times as long as the ring method. The tube of the same diameter as the ring used for ring sampling was pushed into the mud for a distance of 15-30 cm. In this way a plug of mud was obtained which was washed through a series of sieves of decreasing mesh sizes. This method yielded 32% more snails than the ring method when applied to the same site and nearly all of them were less than 3 mm in length. The snails collected were fixed on cellulose tape and measured under a dissecting microscope fitted with an ocular micrometer.

The average densities of the colonies varied from 0.86 to 18.12 snails per ring sample. Statistical analysis of the results showed that there were highly significant differences not only between different colonies but also between the same colonies sampled at different times over a period of nearly two years. Furthermore it could be shown that the density changes independently in different colonies and cannot therefore be due to a common cause such as the weather.

Repopulation of snail colonies

It is obvious that any method of snail control that does not produce permanent changes in the habitat will have to be repeated at fairly frequent intervals if repopulation is to be prevented. It is therefore important to know how long a given percentage of survivors will take to restore a colony to its former density. The average adult life of female snails had already been determined as well as the rate of egg laying, the rate of survival and the time required from egg laying to maturity. From these data it was possible to calculate repopulation curves for different rates of killing. In making these calculations it was assumed that the survival rates under the conditions of low population density prevailing shortly after control measures would be 50% better than those that had been determined under normal conditions. The fact that the survival rate would decrease

FIG 5
REPOPULATION CURVES OF *O. QUADRASI*



again as the population density neared its initial value was ignored since control measures would in practice have to be reintroduced long before this point was reached. The calculated recovery rates for 75%, 85% and 95% kills are shown graphically in Fig 5. The waves reflect succeeding generations of snails—a consequence of assuming that only adults survive. The curve for an initial kill of 85% agrees well with the average observed recovery rate of *O. quadrasi* colonies in Sorsogon province following molluscicidal operations estimated to have killed between 80% and 90% of the collectable snails.

From the repopulation curves it can be deduced that in order to maintain the population density below 20-30% of its normal value it would be necessary to repeat molluscicidal treatment at intervals of about 120 days. The team concludes that a more economic approach would be to effect a radical alteration in the habitat so as to reduce the rate of breeding to the point where the colony would eventually die out. They add "If the land thus changed could then be put into agricultural production the

density but they failed to provide evidence of a combined effect. This was not true however of the rice yields. Ploughing and harrowing alone gave no better yield than traditional farming but when combined with proper spacing of seedlings and weeding they produced a 70% improvement in yield.

Sampling was difficult in these experiments since the snails tended to collect around the rice stalks. A further experiment was designed to overcome this difficulty by use of a special sampling technique and at the same time some deficiencies in the farming methods were remedied. The experiment was conducted jointly by the bilharziasis control project and the Bureau of Agricultural Extension and a graduate of the local agricultural school was employed to supervise the work. Only two types of farming were compared: complete cultivation (Masagana system) and traditional farming. Three plots were farmed by each method and three more left unfarmed as controls. The plots were again arranged in a Latin square. Before ploughing commenced all plots including controls were surrounded by dykes. The snail density in the Masagana plots dropped to 14% of the initial value after the first weeding and recovered to 106% after harvest. After traditional farming there was a drop to 10.2% of the original density followed by recovery to 83%. The control plots showed little change—an increase of 4% was followed by a fall to 86% of the initial snail density. The differences in rice yields were striking. The Masagana plots gave an average yield that was nearly double that obtained by the routine method and almost three times the average for the province. It is clear therefore that the farmer who adopts improved agricultural methods will be amply compensated for the increased work involved and at the same time he will largely rid his fields of vector snail.

Environmental sanitation

In an attempt to assess the effectiveness of sanitation in interrupting the transmission of bilharziasis a campaign of latrine construction was undertaken in the barrio of

Mahrong, one of the hyperendemic areas of Palo. Although no financial or material help was at first available it was possible to persuade 119 of the 142 families to erect their own pit latrines. Unfortunately many of them were of such poor design and construction that they were blown down by a storm five months later. Nevertheless snail colonies near the houses did show some reduction in infection rates shortly after the latrines were first put up.

This experiment could scarcely be considered a fair trial of the value of sanitation. The Philippine Government therefore consented to provide the materials necessary for the construction of a good latrine for every family in Mahrong. This programme took nine months to complete and during this time no effect on snail infection rates was observed. It may be that results could not be expected so quickly but there is no doubt that the people are reluctant to use the latrines provided. Being unconvinced by the germ theory of disease they do not find the pit latrine a superior method of faeces disposal. When defecation is done in the open pigs quickly find and eat the faeces and there is therefore little smell. The latrines give off foul odours and at the same time deprive the pigs of an important source of food. It is hoped however that the people can be gradually educated to use the latrines and monthly checks are being made to establish the extent to which success is being achieved. This experience underlines the importance of team work in programmes of this kind: the sanitary engineer, the health educator and the municipal health officer must work in close collaboration and the provision of improved sanitary facilities should form only one part of a more comprehensive scheme of community development aimed at raising the living standards of the population.

The balance

The general conclusion to be drawn from this extensive survey is that bilharziasis in the Philippines is not an isolated medical problem but one that is closely bound up

covered an area of about 7 hectares made up of abandoned rice fields and deeply water logged meadows. The vegetation was exuberant. From the head of the valley down to the Palo river there was a gradient of 1 in 300 (0.36%). Two canals were cut joining up at the bottom of the valley to flow into the river. A few months later the valley was completely dry and a noticeable change had occurred in the vegetation. Reduction in the snail colony began two months after completion of the canals and after 10 months the snail density had fallen to less than 7% of what it had been initially. Nearly all the snails remaining were adults showing that breeding had been interrupted. At the same time the land had been made suitable for farming. Maintenance of such drainage canals can be very expensive however if they are dug in sandy materials that have a tendency to cave in. Moreover the canals must be kept clear of weeds as they might otherwise become suitable breeding grounds for the local malaria vector.

The effects of combined clearance and drainage were tested in the Magdalena swamps in another part of the Kanbanwa valley. These were formerly covered about a metre deep with mud and overgrown with jungle and floating grasses. The clearing operations were started first and reduced the snail population to 41% of its original size. Subsequent drainage brought about a further reduction to only 4% of the original numbers and in one area no snails have been found for 8 months.

An excessive amount of water can be as detrimental to snails as lack of water. Flooding of a small habitat reduced the snail population to less than 4% of the original density. This suggested that digging a series of ponds might also make an area uninhabitable for snails. An experimental pond 8 m by 28 m and 2 m deep proved very successful and 8 months after its construction no snails could be found. The pond was constructed with vertical sides but this can only be done in suitable soils. The method is expensive but is useful where there are sluggish streams. The earth removed in digging can be used to fill in portions of the stream

bed to make farming plots and the ponds can afterwards be used for fish culture.

Snails and rice farming

Rice farming is one of the principal occupations of Leyte rice being a staple of the diet. In fact rice fields constitute half the snail infested area of Palo. Surveys made in Leyte at the end of the war had suggested that only few snails are found in the fields and that these are washed in from surrounding uncultivated areas but the team found that this was not generally true. Many of the rice fields are permanently waterlogged and support large populations of snails. The system of agriculture is very primitive. The land is not drained or dyked and before planting the weeds are simply trampled into the mud by teams of water buffalo. Seedlings are planted haphazardly and the fields given no further attention until the harvest. The team designed a series of experiments to test whether improved farming would reduce or eliminate the snail populations.

In one experiment traditional farming methods were compared with three different improved methods: ploughing and harrowing followed by traditional planting; traditional preparation followed by regularly spaced planting and weeding; and complete cultivation without dyking. A comparison was also made with land left unfarmed giving five different treatments in all. Each of the treatments was applied to five plots making a total of twenty five plots. These were arranged in the form of a Latin square i.e. so that no two plots in any one row or column received the same treatment. This arrangement eliminates errors due to chance differences between plots.

A parallel experiment was designed to test the effects of dyking on complete cultivation (ploughing harrowing spaced planting weeding and sickling) and on traditional farming. A random arrangement of the plots was used for this experiment. The results clearly showed that each of the improvements (ploughing and harrowing spaced planting with weeding and sickling and dyking) brought about marked reductions in snail

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with local agricultural practices. It is striking that the team's recommendations for keeping down the snail populations of the rice fields agree in every detail with the proposals made by the Bureau of Agricultural Extension for stepping up rice production—and it has been shown that they are capable of doubling the annual yield of rice. But there are many areas harbouring snails that are at present unsuitable for rice growing. Depending upon whether these are swamps, streams or road ditches, they call for different methods of treatment, all of which are costly. Experience has shown, however, that the more radical the change in the habitat, the greater is the reduction in snail density and the less the subsequent cost of maintenance. Half measures are therefore likely to prove false

economy. Moreover, the reclamation of wastelands and improved land utilization may be expected to yield in the long run much greater returns than the initial outlay.

A large scale test of the effectiveness of environmental control in reducing the prevalence of bilharziasis has been started in the Palo area. The work is being co-ordinated with that of other agencies and gradually integrated into the over-all plan for the development of the province. It is expected to take about three years before a proper assessment can be made of the results. By then it should be possible to arrive at a much more accurate figure for the cost per head than is possible at present, and to decide to what extent auxiliary methods of control are necessary.

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Notes and News

About the *WHO Chronicle*

In the early days of WHO its Interim Commission decided that a periodical was needed to give a month by month account of the Organization's activities as well as short and readable accounts of work reported in other WHO publications for the benefit primarily of the different health professions. This periodical first appeared in 1947 with the title *Chronicle of the World Health Organization* and has been issued regularly ever since. The 4300 pages so far published contain a record of what has happened throughout the world in the field of international health since January 1947.

Thus the 145th issue appears with a new title and a new face. The *Chronicle of the World Health Organization* is now the *WHO Chronicle*. The new briefer title simplifies acknowledgements and references and some medical journals have in fact been using it lately in preference to the longer one. This hint has accordingly been taken.

Small as the change of title appears to be it has a significance which may not be immediately obvious. Twelve years ago the new title was one of those considered for WHO's new periodical. It was rejected on the then unchallengeable ground that only a few could be expected to know the meaning of the initials WHO.

The change in the *Chronicle* does not go deeper than its cover. Content, editorial policy and presentation remain unaltered in accordance it seems with the wish of most of its readers.

Since the *Chronicle* was first published three attempts have been made to establish contact with its readers and to learn to what extent it was being found useful or could be improved.

A questionnaire was widely circulated among the technical staff of the Organization

in 1951 and another sent in 1953 to several hundred former WHO Fellows. Although as was to be expected many of the suggestions received in answer were impracticable and some of the criticisms were based on an inadequate understanding of the role and scope of the *Chronicle* as defined by the WHO governing bodies, these contacts with two entirely different groups of readers did result in some constructive criticism. As a consequence a number of adjustments were gradually made, both in the content and in the presentation.

A third attempt to sound the views of readers was made in 1957 on a smaller but more selective scale. With the help of the secretaries of WHO Expert Advisory Panels a few members were selected from each panel and the questionnaire was sent to them. In this manner approximately 100 outstanding experts in various fields were approached.

Comments were invited on nine specific points. Two questions were of special interest: one asking for an opinion on the general usefulness of the periodical, the other dealing with a fundamental aspect of editorial policy, i.e. whether or not *Chronicle* articles should be signed.

The answer to the first question—whether the *Chronicle* was a useful periodical—was overwhelmingly in the affirmative. With the exception of a handful of correspondents whose interests were too specialized for them to find the *Chronicle* of direct use, all those approached stated that they read the *Chronicle* regularly and found it the best way of keeping informed on WHO's work and on international developments in public health in general. Most readers thought that the *Chronicle* contained a great deal of useful information in concentrated form and a comment frequently made or implied was

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Report 1957 38 p (*Wld Hlth Org techn Rep Ser* No 120)

AFRICAN CONFERENCE ON BILHARZIASIS

Report 1957 42 p (*Wld Hlth Org techn Rep Ser* No 139)

found in anonymous articles that a signed contribution enabled the reader to get in touch with the author and that the reader is entitled to know the authority behind the text which he reads. But the main reason prompting these requests for more signed contributions seems to be personal aversion to anonymous texts which is probably to some extent a reflection of differing practices in various parts of the world

* *

In a Foreword published in the first number of the *Chronicle of the World Health Organization* the point was made that "the funds which pay for these [international health] activities come ultimately from the pockets of millions of taxpayers and it is proper that any who are interested should know on what this money is spent. For twelve years the *Chronicle of the World Health Organization* has attempted to do this to carry out soberly its allotted task of informing the reader about the activities of WHO. The *WHO Chronicle* will continue to follow this path in the years to come

The efficacy of smallpox vaccines

The efficacy of a preparation of smallpox vaccine can ultimately only be proved by its ability to protect against the disease. But it is considered highly probable that a vaccine is protective if it elicits a primary vesicular response in the unvaccinated followed by resistance to subsequent vaccination with a potent vaccine lymph.

Dried and glycerinated vaccines were compared by these criteria in a recent experiment in England¹. Both types of vaccine produced 100% vesiculations in primary vaccinations of groups of volunteers and equal resistance to revaccination with a potent lymph one year later. In a parallel experiment the potencies of the same vaccines were reduced by exposure to heat to a point where less than 50% successful primary vaccinations were obtained. All those

however that responded with a primary vesiculation to any of the vaccines used were equally resistant one year later to revaccination with a potent vaccine lymph. The results indicate that dried smallpox vaccines confer satisfactory protection and that the immune states following successful vaccination with vaccines of low potency and of normal potency cannot be distinguished.

A parasitological problem solved

The parasites of filariasis spend part of their life cycle in mosquitos and other blood sucking insects. The parasitologist investigating the extent of infection in mosquitos the species of larvae causing the infection and the stage of their development within the mosquitos is faced with the problem of preserving the mosquitos long enough to be able to dissect them and carry out his observations accurately. A simple method of preserving the mosquitos and staining the filarial larvae before dissection has been developed in Kenya and is reported on in a recent number of the *WHO Bulletin* (*Bull. Wild Hlth Org.* 1958 19 205).

Lung cancer

The fact that the classification and nomenclature of cancer tumours vary from one country to another and even within individual countries makes it difficult to attack the problem of cancer on an international scale. On the recommendation of the Study Group on Histological Definitions of Cancer Types which met in Oslo in 1957 WHO has decided to encourage the establishment of international centres which in collaboration with certain specialized institutions will study the histological definitions of different types of tumour and seek a universally acceptable classification and nomenclature.

As a first step in this direction an international centre for lung cancer has been set up at the Institute for General and Experimental Pathology in Oslo under the direction of Professor L. Kreyberg. A WHO Expert

that to the specialist reader the Chronicle was welcome because of its articles on subjects other than his own. Some correspondents used the Chronicle as teaching material, others used it in their capacity as authors or editors of journals, and the point was made that librarians found it valuable as a permanent source of reference to the work of WHO and a guide to its other publications. One of the views most frequently expressed might be put thus: It provides me with a broad survey of health problems throughout the world and shows how WHO is helping to solve them, and some correspondents stressed that they knew of no other source where they could find such information. Analysis of the replies shows that an overwhelming majority wished the Chronicle to continue and felt that it should not undergo any major changes.

While all readers seemed to understand what the Chronicle is, some failed to see what the Chronicle cannot be. This appeared clearly from some of the replies to the questionnaire.

One reader wanted the Chronicle to bring regular news arranged by countries from the ministries competent for the different fields of public health, from scientific institutions, technical institutions, technical associations, and their leading and influential experts. He added that this type of information is very difficult to get, but would be welcomed by many experts in all countries. The same wish in one form or another has been expressed from time to time by other readers of the Chronicle. There may be need for information of this type, but it cannot be provided by the Chronicle within its present terms of reference, because such activities are not international. The information would be enormously difficult to obtain and even more difficult if not impossible to check for accuracy. So one of the Chronicle's main objects—to offer fully reliable information—would be lost.

Another reader wanted an occasional inclusion of a leading general article by a well known authority on a topical subject [such as] chemical determination of heredity, present status of cancer

research. Here again it may be of interest to some readers to have articles of this type, but it is questionable whether a periodical which is in a way the mouthpiece for an intergovernmental organization would be a logical vehicle for such material. The Chronicle regularly informs its readers of what is actually done in the field of international health. What yardstick could be used for the selection of problems which have not so far been dealt with by WHO?

Yet another reader asked whether the Chronicle could not publish up to date international reviews of medical publications, epidemiological and statistical information. This is an attractive idea and seemed to enjoy a certain popularity. It was considered along with many other possibilities in the Chronicle's early days, but it was not found practicable. A private publisher enjoys complete freedom in the selection of publications for review and criticism. Not so a publication which appears under the imprint of an international organization representing 85 governments and is therefore subject to limitations that must be recognized and accepted.

Opinion on the question of signed or anonymous articles appeared to be divided almost equally, and it is interesting to note that the majority of correspondents appeared to feel quite strongly one way or the other in this respect. Some supported the present policy of the Chronicle, which is to offer signed contributions only in exceptional cases. The arguments advanced were that unsigned contributions carried greater weight, that the names of many of the authors were bound to be known only to a small group of specialists, and so would add nothing to the value of the contributions, and that signed contributions belonged elsewhere—to the *Bulletin of the World Health Organization* if they were technical, to *World Health* if they were popular. Other correspondents favoured a departure from the present policy and the more frequent inclusion of articles signed by consultants and members of Expert Committees. The arguments advanced here were that the kind of experience conveyed in signed contributions of this type could not be

can be extremely helpful to the health administrator

A Conference on Hospital Statistics and their Application in Health Administration sponsored by the WHD Regional Office for Europe met in Geneva from 24 to 28 November 1958. It was attended by health administrators and statisticians from Austria, Belgium, Czechoslovakia, Germany, Greece, Ireland, Italy, the Netherlands, Poland, and Yugoslavia. The participants reviewed the present status of hospital statistics in Europe and discussed the problems involved in their future development with special emphasis on their use in the evaluation and planning of hospital services.

New pamphlet on WHO

A 20-page pamphlet entitled *The World Health Organization—Its Global Battle against Disease* was recently published by the Public Affairs Committee of New York, an educational organization founded in 1935 "to develop new techniques to educate the American public on vital social and economic problems and to issue concise and interesting pamphlets dealing with such problems deemed wherever possible from the long time studies of leading research institutions.

The pamphlet on WHO was prepared by Mr. Albert Oetusch, a well-known writer on health and welfare subjects to commemorate the Organization's tenth anniversary and has a preface by Dr. Charles W. Mayo of the Mayo Clinic, Rochester, Minn. It costs \$0.25 and can be obtained from Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y., U.S.A.

Appointment of a new Assistant Director General

Dr. Nicolay Ivanovich Grashchenkov of the USSR has been appointed Assistant Director General of WHO to replace Dr. W. A. Timmerman who recently retired. Born in the Smolensk region in 1901, Dr. Grashchenkov is a graduate of the Medical Faculty of the University of Moscow. In 1938 he was appointed to the Chair of

Neurology at the first Moscow Medical Institute and in 1955 he became Chairman of the Medical Research Council of the USSR Ministry of Health. He has been a member of scientific missions to England and the United States and a delegate to the last two World Health Assemblies.

In his position as one of the three Assistant Directors General of WHO, Dr. Grashchenkov will advise the Director General on major questions of policy and will be responsible for technical aspects of liaison with the regional offices and other agencies.

Organizational changes at WHO Headquarters

The Director General of WHO has decided to make several organizational changes at WHO Headquarters so as to adapt the Secretariat to developments which have taken place in the Organization's work over the past few years.

Division of Epidemiological and Health Statistical Services

The Division of Epidemiological and Health Statistical Services has been renamed the Division of Health Statistics with effect from 1 January 1959. International Quarantine has been transferred to the Division of Communicable Disease Services and the remaining sections have been converted and renamed as follows: Health Statistical Methodology (formerly Statistical Studies), Consolidation of Health Statistics (formerly Epidemiological Studies), International Classification of Diseases and Development of Health Statistical Services (formerly International Classification of Diseases and Causes of Death).

Division of Therapeutic Substances

The Division of Therapeutic Substances has been renamed the Division of Biology and Pharmacology with effect from 1 January 1959. In addition to the Office of the Director, it now includes Radiation and Isotopes (formerly Atomic Energy in Relation to Health) in the Office of the Director General.

Committee on Pharmacology met at the Centre from 7 to 22 November 1961 to study the classification and nomenclature of tumors of the lung and to revise existing programmes in the Centre and groups associated with it. The members of the Expert Committee were Professor I. Dörmann (France), Professor H. Boman (Germany), Professor L. Kirschberg (Norway), Professor A. Leshem (USA), Professor C. Smith (United Kingdom), and Professor E. Uhlirger (Sweden). Dr C. Simonson (WHO) was Secretary to the Committee.

International Pharmacopoeia: specifications for reagents

The World Health Organization desires to publish a volume containing recommendations for the reagents required in connection with the tests described in volumes I and II and the Supplement of the International Pharmacopoeia. Draft specifications have been prepared with the advice of members of the Expert Advisory Panel on the International Pharmacopoeia and International Pharmaceutical Organizations.

A tentative list of these reagents will be available on request. Comments on the draft recommendations are invited, and copies of the draft may be obtained at the request from the Secretary, Expert Advisory Panel on the International Pharmacopoeia and International Pharmaceutical Organizations, World Health Organization, Palais des Nations, Geneva.

Expert Committee on the International Pharmacopoeia

Although a Supplement dealing with a series of new pharmaceuticals is to be added to the present edition of the International Pharmacopoeia, it has been felt that a revised and enlarged edition, based on revised analytical methods, would be desirable. The revision of this new edition via the informal series discussed at the WHO Expert Committee on the International Pharmacopoeia, which met at Geneva from 11 to 15 November 1961.

The Committee also agreed to discuss to the extent that WHO should use

information sheets on new pharmaceutical preparations to assist Pharmacopoeial Commissions and national Health Administrations in the early control of the quality of new drugs and of their pharmaceutical forms. This issue had been generally welcomed by national drug control administrations and it was necessary to obtain the support of the pharmaceutical industry, which would be called upon to supply much of the information required.

A report on the activities of the Centre for Archaemic Chemical Substances in Stockholm was examined. The availability of boron in this Centre, a number of chemical substances as well as making-room resources, capacity, and of analytical instrumentation was considered.

In accordance with a resolution adopted at the WHO General Assembly of the International Pharmaceutical Federation and in response to requests from several countries the Committee also discussed the measures which could be followed in different countries in reducing loss of pharmaceutical substances and materials in the solid in preparation.

The following experts were invited to attend the Expert Committee: Professor H. Boman (Sweden), Professor A. Calh (Belgium), Dr T. Carlsson (Sweden), Chairman, N. T. C. Derson (United Kingdom), Rapporteur, Professor I. A. Gaurier (France), Dr J. A. Loh (Germany), Dr L. C. Miller (USA), Rapporteur, Professor V. Sen (USSR), and Professor C. Savagonda (Thailand), Vice-Chairman. The consultants to the Expert Committee were Mr G. P. Bowe (United Kingdom), Professor H. Flu (Switzerland), and Professor R. Ward (France). Mr P. Pann (WHO) acted as Secretary to the Committee.

Hospital statistics and their application

With the rapid increase of hospital services throughout Europe there is a corresponding need for better evaluation of the medical, administrative, and other aspects of their work. In this connection hospital statistics

can be extremely helpful to the health administrator

A Conference on Hospital Statistics and their Application in Health Administration sponsored by the WHO Regional Office for Europe met in Geneva from 24 to 28 November 1958. It was attended by health administrators and statisticians from Austria, Belgium, Czechoslovakia, Germany, Greece, Ireland, Italy, the Netherlands, Poland, and Yugoslavia. The participants reviewed the present status of hospital statistics in Europe and discussed the problems involved in their future development with special emphasis on their use in the evaluation and planning of hospital services.

New pamphlet on WHO

A 70-page pamphlet entitled *The World Health Organization—Its Global Battle against Disease* was recently published by the Public Affairs Committee of New York, an educational organization founded in 1935 to develop new techniques to educate the American public on vital social and economic problems and to issue concise and interesting pamphlets dealing with such problems derived wherever possible from the long time studies of leading research institutions.

The pamphlet on WHO was prepared by Mr. Albert Deutsch, a well-known writer on health and welfare subjects to commemorate the Organization's tenth anniversary and has a preface by Dr. Charles W. Mayo of the Mayo Clinic, Rochester, Minn. It costs \$0.25 and can be obtained from Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y., U.S.A.

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Committee on Histopathology met at this Centre from 17 to 22 November 1954 to study the classification and nomenclature of tumours of the lung and propose a working programme for the centre and groups associated with it. The members of the Expert Committee were Professor J. DeLoré (France), Professor H. Hampel (Germany), Professor L. Kirschberg (Norway), Professor A. Lebow (USA), Professor R. Scott (United Kingdom) and Professor E. Lehninger (Switzerland). Dr R. Sarcowicz (WHO) was Secretary to the Committee.

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The World Health Organization proposes to publish a volume containing specifications for the reagents required in connexion with the tests described in Volumes I and II and the Supplement of the International Pharmacopoeia. Draft specifications have been prepared with the advice of members of the Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations.

A tentative list of these reagents will be supplied on request. Comments on the draft specifications are invited, and copies of the drafts may be obtained for this purpose from the Secretary, Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations, World Health Organization, Palais des Nations, Geneva.

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Although a Supplement dealing with a series of new pharmaceuticals is to be added to the present edition of the International Pharmacopoeia, it has been felt that a second and enlarged edition, based on revised analytical methods, would be desirable. The preparation of this new edition was the principal subject discussed by the WHO Expert Committee on the International Pharmacopoeia, which met in Geneva from 10 to 15 November 1954.

The Committee also reviewed reactions to the proposal that WHO should issue

information sheets on new pharmaceutical preparations to assist Pharmacopoeia Commissions and national Health Administrations in the early control of the quality of new drugs and of their pharmaceutical forms. This idea had been generally welcomed by national drug control administrations and it was necessary to obtain the support of the pharmaceutical industry, which would be called upon to supply much of the information required.

A report on the activities of the Centre for Authentic Chemical Substances in Stockholm was examined. The possibility of keeping at this Centre a number of chemical substances to serve as melting-point reference standards and for checking spectrophotometers was considered.

In accordance with a resolution adopted at the XVIIIth General Assembly of the International Pharmaceutical Federation and in response to requests from several countries the Committee also discussed the principles which could be followed in different countries in preparing lists of pharmaceutical substances and specialties to be sold on prescription.

The following experts were invited to attend the Expert Committee's session: Professor H. Baggergaard Rasmussen (Denmark), Professor A. Calo (Italy), Dr T. Casbäck (Sweden), Chairman Mr T. C. Denison (United Kingdom), Rapporteur Professor J. A. Gaultier (France), Dr P. H. Leu (Germany), Dr L. C. Miller (USA), Rapporteur Professor P. Smol (USSR) and Professor C. Savagonda (Thailand), Vice-Chairman. The consultants to the Expert Committee were Mr G. R. Brown (United Kingdom), Professor H. Flück (Switzerland) and Professor R. Hazard (France). Mr P. Blot (WHO) acted as Secretary to the Committee.

Hospital statistics and their application

With the rapid increase of hospital services throughout Europe, there is a corresponding need for the proper evaluation of the medical, administrative and other aspects of their work. In this connexion, hospital statistics

solely due to adsorption to the glass walls of bottles and ampoules of more than half of the diluted tuberculin sometimes much more than half so that it is not surprising if the small amount of unadsorbed tuberculin varies from ampoule to ampoule

The third of the papers gives further information on the dependence of the adsorption on the diluent used. That tuberculin diluted in saline is weaker than tuberculin diluted in buffer has been known for a long time but this effect is now seen to be due to increased adsorption. The adsorption may be further inhibited by the use of other additives besides buffer salts: proteins such as blood albumin or gelatine reduce the adsorption considerably but of all the additives tested so far the non ionic detergent "Tween 80" gives the strongest and most constant stability. The authors suggest that Tween 80 (in a concentration of 0.05 %) be used as a matter of routine in the future as additive to the tuberculin diluent so as to prevent unpredictable variations in the potency of the dilutions.

The next two papers are concerned with a new very large batch of tuberculin recently produced in the Statens Seruminstitut Copenhagen at the request of UNICEF. First the preparation of this batch is described. Cultures of tubercle bacilli on a synthetic medium were subjected to heat treatment, sterile filtration, ultrafiltration and precipitation with trichloroacetic acid and the precipitate was dehydrated with ether. Seven different strains of human type tubercle bacilli were used and several sub-batches made from each. After the sub-batches had been found to be fairly uniform in potency by testing in guinea pigs they were pooled and thoroughly mixed. The total lot came to 670 grams and is tentatively designated RT 23.

The new tuberculin was standardized in human populations in the *Netherlands*, *Nigeria*, *Mauritius* and *Denmark* as well as in guinea pigs sensitized in several ways. The standardization included not only a comparison with the International Standard for the Purified Protein Derivative of *Mycobacterium tuberculosis* (PPD-S) but also with

the earlier products from the Statens Seruminstitut RT 19 20-21 and RT 22. For RT 23 both buffer diluent with Tween 80 and buffer diluent without Tween 80 were used. For the other tuberculins only buffer diluent without Tween 80 was used.

The comparisons which are reported in the final paper gave very definite evidence of "qualitative" differences between the tuberculin products so that no single absolute standardization is possible. In the light of the results in naturally infected humans in terms of reaction size it is suggested that the following doses be considered equipotent for practical purposes:

0.000084 mg (including 0.000024 mg of buffer salts) of the International Standard (3 TU)
0.0001 mg of RT 19 20-21 ("5 TU")
0.00009 mg of RT 22 ("7 TU")
0.00006 mg of RT 23 without Tween 80
0.00007 mg of RT 23 with Tween 80

To keep in agreement with the terminology of the existing definition of the International Tuberculin Unit it seems necessary to define one unit of RT 23 in terms of dry weight and irrespective of the diluent used. As 0.00006 mg of RT 23 (diluted without Tween) corresponds to 3 TU of the International Standard (diluted without Tween) one unit of RT 23 thus becomes 0.00002 mg of the dry substance. This means that the dilution of RT 23 with Tween 80 which may substitute "5 TU" of RT 19 20-21 must be labelled "one tuberculin unit". This is regretted by the authors as it will no doubt cause some confusion.

If 0.00002 mg of RT 23 stabilized with Tween 80 is accepted as the future standard test there is (neglecting losses) a total of 33 000 000 000 doses of 0.00002 mg each in the whole batch. Even if this is not enough to cover world requirements until the complete eradication of tuberculosis has been effected it may last for a great many years very likely until after it has been outmoded by new types of tuberculin especially tuberculins with selected properties of specificity.

The list of contents will be found in the advertising section at the end of this number of the Chronicle.

Biological Standardization Pharmaceuticals Addiction Producing Drugs

Health Laboratory Methods has been transferred to the Division of Organization of Public Health Services and its title has been changed to Health Laboratory Services

Division of Organization of Public Health Services

Two new units of activity—namely Cardiovascular Diseases and Cancer—have been created in the Division of Organization of Public Health Services with effect from 1 November 1958

Division of Communicable Disease Services

One new unit of activity—namely Leprosy—has been created in the Division of Communicable Disease Services with effect from 1 November 1958

With effect from 1 December 1958 the Departments of Advisory Services Central Technical Services and Administration and Finance have been abolished From that date each Assistant Director General has been responsible for directing the activities of certain divisions and offices as assigned by the Director General Thus Dr P M Kaul is in charge of the Divisions of Communicable Diseases, Organization of Public Health Services Education and Training Environmental Sanitation and Malaria Eradication as well as the Offices of Programme Coordination and Programme Evaluation Dr N I Grashchenkov is responsible for the Divisions of Health Statistics Biology and Pharmacology and Editorial and Reference Services and Mr M P Siegel for the Division of Administrative Management and Personnel the Division of Budget and Finance the Legal Office and the Office of Internal Audit

Review of WHO Publications

TUBERCULIN

Bulletin of the World Health Organization
Volume 19 Number 5 (pages 759-952)

Variation in tuberculin potency is the main theme of the papers in this issue of the Bulletin which is concerned with the production dilution stabilization and storage of the purified tuberculin (PPD) used in BCG campaigns and other projects sponsored by UNICEF and WHO This collection of papers has been prepared by the WHO Tuberculosis Research Office and the Statens Seruminstitut Copenhagen

The first three papers deal with the stability of PPD when diluted as for use in intradermal testing that is in the ratio 1/1,000,000 or thereabouts The first paper is concerned with long term storage and

demonstrates that in the main tuberculin dilutions are surprisingly stable it is concluded that tuberculin in diluted form ready for use may be distributed in simpler and less expensive ways than hitherto often used

The data from these studies of storage do however show unpredictable variations in potency between dilutions prepared in the same way from the same stock solution and even differences in potency between ampoules filled with tuberculin dilution from the same container These variations are further examined in the second paper together with another manifestation of instability observed by the authors—namely that a tuberculin dilution kept in a bottle or ampoule which is only partially filled loses most of its potency (per unit volume) relative to a similar dilution kept in a bottle which is completely filled Evidence is offered that these phenomena are

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- 87 *Nuclear energy medical training and public health*
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WORLD HEALTH ORGANIZATION

Tenth Anniversary Commemorative Session held by the World Health Assembly at Minneapolis 26-28 May 1958 Geneva 1958 (Off Rec Wld Hlth Org No 86) 81 pages Price 3/6 \$0.70 or Sw fr 2— Also published in French and Spanish

A special session of the World Health Assembly was held at Minneapolis Minne

sota USA from 26 to 28 May 1958 to commemorate the tenth anniversary of the World Health Organization

This volume contains the full verbatim records of the proceedings a summary of which has already appeared in the Chronicle¹

Ch Wld Hlth Org 1958 12 19

ADDENDUM

Vol 12 No 10

DENTAL HEALTH SERVICES FOR CHILDREN

Page 341 footnote (list of participants)

add Dr W Kessler (Federal Republic of Germany)

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958

1 Historical Introduction

The Chronicle has on several occasions in the past published comprehensive accounts of WHO's work in various fields including the epidemiology (1954 Vol 18 No 23) malaria (1955 Vol 9 No 23) disease control and international travel (1956 Vol 10 No 9-10) and health care (1959 Vol 13 No 1). The article that follows is the first part of a report of WHO's work in international health statistics by Dr H. S. G. Jomarl, Assistant Director General, Department of Central Technical Services, WHO, and Dr Y. Brundage, Director of Health Statistics, WHO.

The general principles of the science of health statistics as of most others were foreshadowed by the ancient Greeks who carefully observed, recorded and analysed natural phenomena and applied the inductive method of reasoning in a search for natural rather than supernatural causes treating the unproven with scepticism. Nevertheless the proper understanding of the behaviour of disease—how and why disease in a human (or animal) population spreads, waxes and wanes or alters its character in response to the ceaseless changes that take place in its host and environment—had to await the techniques of study and experiment provided by modern epidemiology, statistics, microbiology and biochemistry.

It is a curious fact that the use of statistical techniques in this field began not with doctors but with the work of John Graunt, a London draper¹ in the middle of the seventeenth century. Graunt carried out an examination of the London Bills of Mortality which were records of births and deaths based on the parish registers. His findings first published in 1662 marked the beginning of a science which has shown that human life conforms to broad and predictable patterns. Epidemiology, vital statistics, demography

and even life insurance are greatly indebted to this small volume.

Parish registers—which provided the basic material for Graunt's book—had been in existence for a century or so not only in England but also in a number of other European countries and in their colonial possessions from the Philippines to Mexico and Peru. In France the keeping of parish registers was made compulsory in 1539 and from 1670 on they were used by Colbert as a source of statistics for Paris. The Breslau registers enabled Halley the astronomer to construct his famous mortality table in 1692. From 1749 the Swedish registers which had been made compulsory in 1686 were used for the preparation of annual statistics.

This statistical material supplemented or even served as a substitute for censuses. In France in 1788 Necker estimated the population by multiplying recorded births by 25.75 and Laplace the mathematician after making an early use of sampling methods did the same in 1802 on the basis of a ratio of 28.35 births to 1000 population.

During the eighteenth century considerable interest developed in the numerical aspects of all matters of concern to the state and in Germany under the name of *Staatenkunde* they became a regular subject for teaching in the universities. Achenwall a professor at Göttingen probably did most to spread the use of the word "statistics" to

¹ Graunt H. S. (1953) *Annals of the Royal Society of Medicine* 46: 217.

² Graunt J. (1662) *Natural and political observations made and concluded in following trade and made upon the Bills of Mortality* London.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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forward another list in which diseases were grouped according to their clinical or (as far as was then known) their etiological and pathological characteristics. After some discussion the congress reached a compromise adopting a classification which made use of both systems.

Later developments would seem to confirm that the decision taken by the congress was a wise one. International classifications of causes of death have been subjected to much critical scrutiny and revision since 1855 and of the many proposed lists based on a single classification whether anatomical etiological chronological or otherwise none has proved any more practicable than the empirical grouping adopted in 1855.

International statistical congresses continued to meet in various capitals at two- or three-year intervals up to 1876 two years after Quetelet's death when disagreement between some governments and the permanent commission of the congresses brought them to an end. Their place was taken by the International Institute of Statistics which was created in London in 1885. At its meeting in Vienna in 1891 the Institute set up a committee to deal with the international list of diseases with Dr Jacques Bertillon, Head of the Statistical Services of the City of Paris as its chairman.

In 1893 on the suggestion of Guillaume Director of the Federal Bureau of Statistics Switzerland the basic international classification was maintained but three lists were drawn up for its application: a detailed list, an intermediate list and an abridged list containing 161, 99 and 44 titles respectively. The purpose of these lists was to maintain comparability between the statistics of countries in which facilities for the recording of diseases and for statistical processing differed widely.

In 1898 the American Public Health Association meeting in Ottawa recommended that the international lists be brought up to date by decennial revisions and this principle was endorsed by the International Institute of Statistics in 1899 in Christiania. Decennial revision conferences were accord-

ingly held in 1900, 1910 and 1920 and through Bertillon's influence they were held in Paris.

When Bertillon died the 1920 revised international lists were left in abeyance and it was not until 1924 that the Health Organisation of the League of Nations took up the question of continuing the work and completing their publication. It established a joint committee with the International Institute of Statistics for the preparation of the 1929 revision which included extensive studies on morbidity and its classification. The same procedure was adopted for the 1938 revision. In 1945 the United States Government which had been requested by the Fifth Revision Conference to continue its investigations into rules for the selection of joint causes of death began preparing the sixth revision and convened in Washington a small committee which included in addition to experts from Canada and the United Kingdom the former Head of the League of Nations Health Statistical Services.*

In 1947 WHO took over the work of preparing the sixth revision from the United States Government and completed preparations for the Sixth Revision Conference which took place in Paris in 1948 under the joint auspices of WHO and the French Government. The international lists of causes of disease and death then adopted were endorsed by the First World Health Assembly as an annex to WHO Regulations No. 1.

Continuous efforts have thus been made for more than a hundred years to bring about international uniformity in disease nomenclature and classification. Even if the related subjects of uniform certification of causes of death and selection of joint causes for the tabulation of both morbidity and mortality statistics are taken into account the progress made in this field forms only a small part of the developments in health statistics that have taken place during the same period.

One of the great advances has been the publication by an increasing number of countries of annual returns of births and

* Dr Yves B. du Roy had been Assistant Secretary-General of the Fifth Revision Conference and had edited its official report.

designate the new science but *Sussmilch's* book³ played an important part in making it internationally known

Statecraft had long recognized that knowledge of the numerical size of the population was essential to efficient administration. Censuses were taken in the earliest civilisations—for example among the Sumerians, Egyptians and Romans and in the Chinese and Inca Empires. Only many centuries after the fall of the Roman Empire however were population counts again made in western Europe. These new censuses such as those of 1328 in France and of 1594 in Spain were little better than estimates based upon the number of hearths in each parish and the rough proportion of inhabitants to each hearth.

The first modern census listing each inhabitant by name was probably that carried out in Canada (Quebec) in 1665. The same method was used in other French overseas possessions during the following century long before a proper census was taken in France itself. Fairly accurate censuses were carried out in Sweden and Finland in 1749 in Connecticut in 1756 in Massachusetts in 1764 in Denmark and Norway in 1769 and in the United States as a whole in 1790. In England proposals for a census were rejected in 1753 and 1778 and the first census was not carried out until 1801 which was also the year of France's first census. Prussia followed suit in 1810 and Austria in 1818. During the period 1830-1850 there were so many people recording statistics and theorizing on statistical method that Westergaard justly called it the era of enthusiasm for vital statistics.

In England the Royal Statistical Society was founded in 1833 and the General Register Office in 1834. A physician William Farr (1807-1883) who held the post of examiner and compiler of abstracts in the General Register Office was largely responsible for the publication from 1837 on of yearly statistics of causes of death and for the regular computation from 1841 on

of mortality tables for the whole population. In the opinion of Pearl present-day procedures in official vital statistics owe more to Farr than to any other person⁴ and the memorial volume of selections from his reports and writings⁵ which shows the stress he laid *inter alia* upon the use of death rates as a measure of local or national health the importance of population density, the dangers of overcrowding and the value of uniform nomenclatures of disease gives some idea both of his influence and of his pioneering spirit.

About the same time as Farr entered the General Register Office much study was being devoted in Europe to the theory of probability which is of fundamental importance in statistics. Laplace had published an important work on the subject (1814) and he was followed by Poisson (1836-37) and Cournot (1843). In France Demouffrand published essays on population and on mortality in 1838 and 1839 and Gavaret a work on general principles of medical statistics in 1840. In Germany Casper published a study on the probable duration of human life (1835). Moser one on the laws of the duration of life (1839) and Christian Bernoulli a statistical handbook on population (1840). Quetelet published a book on social physics in 1835 and did a great deal towards adapting the theory of probability for use in statistics. From 1851 onwards Quetelet together with Farr and Babbage began more and more to impart an international slant to vital and health statistics by organizing international statistical congresses.

The first international statistical congress was held in Brussels in 1853 and the need for uniform nomenclature and classification of diseases as a prerequisite for the international comparability of medical statistics was quickly realized. In the second congress held in 1955 Farr put forward for international adoption the classification into five classes that was in use in the General Register Office. D Espine from Geneva put

³ *Sussmilch's* (1761) *Di g i l h O dnu g l n d v a*
d ge d s m c l i h G c h l h t G b r d m T o d
d d F t p f g d l b t B e t l

⁴ *Pearl R. (1940) I t o d t t m d l b l m r y a n d*
J. H. 3 d d S a d r s P h i d l p h d L o d n
⁵ *Humph y N A d (1885) I t l i t i A m m i l*
I m f l t i o n s f m t h p o t a d i g f W i l l a m
F. T h S a n t a r y I t t e L o d

appeared in the *Bulletin of the Health Organisation* ³

In the century which ended with the Second World War much progress was made in vital and health statistics by governmental services intergovernmental institutions and scientific societies both national and international. Little by little the value of official mortality records morbidity data collected by social insurance organizations and hospital statistics as sources of information on the health of the population and as a basis for planning health policies began to be realized by an increasing number of health administrators and statesmen. By their efforts health statistics improved in

quality and increased in quantity until by the end of the Second World War they had grown to formidable proportions.

Progress had not been uniform however. Mortality statistics recorded according to international rules of classification were available for highly developed countries but for very few others so that there were enormous gaps in the coverage of the world as a whole. Morbidity statistics were available for a large number of territories but lacked uniformity and therefore comparability.

This was the situation when WHO took over the functions of the League of Nations Health Organisation. Subsequent sections will show what it has so far done in the field of international health statistics.

³ Bibliography of the Technical work of the Health Organisation of the League of Nations, 1910-1945. R. H. HIA. G. L. N. 1945. II.

MALARIA ERADICATION

More than seventy countries or territories are now committed to the eradication of malaria but to ensure success in the battle against the disease further effort is needed.

To underline the need not only for continuing the battle but for waging it even more intensively WHO recently published a 12 page pamphlet entitled *Malaria Eradication A Plea for Health*. In an introduction to this publication Dr M. G. Candau, Director General of WHO, speaks of the present "golden opportunity to free mankind of the world's most prevalent disease" and goes on to mention the enthusiasm aroused by the idea of eradication among the governments of malaria stricken countries which are committing over \$325 million from their limited resources for expenditure on eradication schemes for the next five years. "Success or failure however depends on the support of more privileged members of the world community and on the timeliness of that support. Because of the steadily increasing resistance of malaria vectors to insecticides the carrying out of the eradication programme has become extremely urgent. The choice

lies between eradication within a certain period and no eradication at all."

The problem

The pamphlet opens with a survey of the economic and social repercussions of malaria — "the world's most expensive disease". As recently as 1955 it was estimated that malaria affected 200 million people and caused 2 million deaths each year. More than 1100 million people are still exposed to the disease and even in the areas from which it has been eradicated there is the ever present danger of its reintroduction. In at least 120 countries and territories of the world out of a total of some 200 malaria acts as a drag on economic development although it is not yet possible to assess statistically the full economic effects in all the areas where the disease is rife.

Not the least serious effect of malaria on a national economy is the constant drain on resources represented by expenditure on medical care. In fact the total amount of this expenditure over a five year period may

operation with the governments and the other international agencies concerned. If it is successfully completed "malaria eradication will have reached an advanced stage in many of the stricken areas of the world and some 500 million people hitherto at risk may be free from the danger of the disease."

The sum required for malaria eradication during the next five years is estimated at approximately \$600 million. Of this about 55% will be contributed by the governments of the malaria stricken countries and a further 35% is anticipated from such sources as the United States International Cooperation Administration (ICA), USA Loan Capital and the United Nations Children's Fund (UNICEF). To provide the remaining 10% WHO will have to raise approximately \$50 million from voluntary contributions as well as covering part of the sum through its regular budget and the Expanded Programme of Technical Assistance. As the organization responsible for the overall planning of the world wide programme WHO has furthermore to encourage research, provide advisers, consultants and other experts to governments, assist in national planning and in the training of local personnel and extend any further assistance that may be required in the organization and implementation of eradication projects.

To enable the Organization to meet these responsibilities the Eighth World Health Assembly established the Malaria Eradication Special Account (MESA) to be financed by voluntary contributions from governments and private sources. A similar fund—the Special Malaria Fund of the Pan American Health Organization (PAHO)—has been established to finance eradication programmes in the Region of the Americas.¹ Both funds are distinct from the regular WHO budget and the funds provided under the Expanded Programme of Technical Assistance. The estimated total expenditure for the operations planned to be financed from these funds for the period 1958-1962 is \$48 512 835.

Contributions to the Malaria Eradication Special Account and the PAHO Special Malaria Fund can at present be raised only in the economically more developed countries. WHO therefore appeals urgently to these countries and their institutions to supplement the efforts of the less privileged countries to rid the world of malaria. In the words of the pamphlet "The capital invested in eradication programmes will be regained in a few years. And once eradication is achieved the world community as a whole richer and poorer members will benefit."

See Chron. Wld Hlth Org. 1958, 12, 309.

THE PUBLIC HEALTH NURSE

Europe was the birthplace of what is known as "public" health and it is in certain European countries that public health in terms of comprehensive health care as a government responsibility is most advanced. The pattern of health services varies considerably from one European country to another and even within individual countries but all countries have in common a need for frequent appraisal of existing services in the light of changing social and medical conditions and for constant effort to improve and expand these services. International

exchanges of knowledge and experience are particularly useful aids to national progress. It was to afford an opportunity for such an exchange that the WHO Regional Office for Europe in collaboration with the Government of Finland sponsored a two-week conference in August 1958 on one of the most important components of public health services—public health nursing.

The State College of Nursing in Helsinki

¹ The conference report on which this account is based is published through the WHO Regional Office for Europe, 2, Sølbergsgade, Copenhagen, Denmark.

be as much as the estimated cost of malaria eradication for which the capital outlay is limited to a period of about five years. The average costs of malaria control by residual spraying per person protected were recently estimated as follows

Region	Cost per person protected, U.S.S.
Africa	0.41
The Americas	0.455
South East Asia	0.11
Europe	0.20
Eastern Mediterranean	0.20
Western Pacific	0.175

The cost of eradication would be 10% higher

Losses in manpower are another serious consequence of malaria. Deaths occurring at 15 years of age or under may be considered to represent a net economic loss to society and in many parts of the world mortality in infants and children caused by malaria is extremely high. In Africa for instance some 10-15% of children under 4 years of age die of the direct effects of the disease. Moreover malaria increases the mortality from other diseases.

As regards loss of working time each infected adult suffers from at least one recurrence of malaria annually which incapacitates him for six days. Computation of the total number of malaria cases and the percentage of the economically active population shows that in 1955 the annual loss of working time due to the average six day attack was some 130 million man days in India, 4 million in Mexico and from 9 to 9.5 million in Thailand. In addition malaria decreases working capacity throughout the year. In India for example assuming a 25% decrease in working capacity the annual economic loss due to this factor is about \$450 million.

The effect of malaria on land utilization is also great. In the densely populated monsoon areas of Asia, in Central America and equatorial Africa great tracts of fertile land lie uncultivated or abandoned because of malaria—and the situation thus created is aggravated by the growth of population and the increased pressure on land. During the

past ten years as a result of malaria control large areas of unused rich agricultural land have been brought under cultivation in Ceylon, India, Java, Mexico and elsewhere. Malaria also slows up engineering projects and industrial development generally and adds to the costs of manufacture and mining in tropical and sub-tropical areas.

The apathy and lethargy caused by malaria are serious obstacles to the success of programmes of social improvement and agricultural development. Educational programmes also are hampered by the disease since to the child with malaria improved schooling can bring little benefit.

Towards eradication

Methods of malaria control and eradication have been extensively reported in past numbers of the *Chronicle*. For those unfamiliar with the subject the pamphlet explains why malaria is now believed to be amenable to control and indeed complete eradication.

The present status of malaria eradication throughout the world is summed up as follows: "Nine countries or territories once highly malarious have reached the maintenance stage of their programme. Seven others are far advanced in their stage of attack. In forty-five an eradication programme is being implemented. Fourteen are about to plan or start field operations. About sixty countries or territories have yet to take the first steps towards malaria eradication."

Urgency and needs

With the development of resistance by mosquito vectors to commonly used insecticides in different areas malaria eradication has become a race against time. In fact there are indications that the insecticides now available may become ineffective within five to ten years. A programme of malaria eradication operations in many countries of the world for the period 1958-1962 has therefore been drawn up by WHO in co-

See in particular: *Ch. H. H. H. Org. 1955* 9 No. 3
See also *Ch. H. H. H. Org. 1954* 8 3 8 1955 9 53
1956 10 69 73 354 1957 11 3 1958 12, 366 371 1

rehabilitation expanded health education radiation hazards etc The assignment of priorities depends on the urgency of the respective needs the level of public education and readiness of the people for action and the financial and personnel resources available Frequent assessment of the situation is essential in order to keep pace with changing conditions and medical and social advances

Planning services to meet health needs requires first and foremost co-ordinated leadership preferably by a government authority Decentralization is also desirable however planning must be undertaken at the local level by people familiar with the local situation and able to assume the requisite responsibility The key members of the health team—usually the physician the public health nurse and the sanitary engineer—should all have a part in administrative planning

Certain developments—some of them admittedly more of an ideal than a reality in a number of countries—will doubtless affect health programmes in the future if not immediately

(1) the development of medicine as a social science in which the physician accepts responsibility for promoting the health of the family rather than caring for sick people for a fee and in which the hospital becomes a starting point for public health work in education after-care and social adjustment

(2) the joining of preventive and curative services of the forces of public health with those of the general practitioner and the hospital

(3) an increased emphasis on individualized services in preference to mass control activities and on group activity as a means of aiding the individual

(4) the elimination of specialized activities in favour of more generalized services which are often less costly in time and personnel and more satisfactory to the people served

(5) the recognition of health education as a fundamental part of every health activity and

(6) the participation of the public in health activities

The role of public health nursing

With the trend towards integrated health services the distinction between the hospital nurse and the public health nurse is becoming less marked the differences in their functions are largely those of emphasis with the hospital nurse giving more attention to care of the sick and the public health nurse concentrating on promotion of health prevention of disease and rehabilitation

The public health nurse's first duty is to provide comprehensive nursing services to individuals families and groups usually as an agent of an organized community nursing service She gives direct home care to the sick teaches and supervises an auxiliary worker or a family member who will give such care or refers the family to another source of nursing service She sees to it that patient-care is continued to the point of best possible recovery a task which often embraces the process of rehabilitation She takes an active part in immunizations health inspections the collection of specimens for laboratory examinations and the performance of an increasing number of diagnostic tests Most important she acts as a family health counsellor mobilizing the necessary community resources to serve the needs of the family and strengthens the relationship between the family and the general medical practitioner The public health nurse because of her closeness to people at critical moments—birth death sickness—is in a unique position to win the family's confidence and to teach its members how to cope with their health problems Her teaching function goes beyond giving advice to individuals and families however she may be called upon to lead or to instruct formal or informal groups in discussions relative to health In all her work the public health nurse encounters social as well as medical problems and she must be well enough informed concerning social resources to refer families in need of assistance to the proper agencies or offices

Because of her close contact with the inhabitants of a community the public health nurse is able to make a valuable

played host to conference participants from 26 countries. The conference was preceded by a year's preparation which included preliminary national meetings in 23 of the countries represented. Discussions at the national level were based on a guide distributed by WHO and proved extremely useful on two counts: they not only supplied current information on the national situation but also provided a stimulus for the assessment of public health nursing needs and services and a basis for plans for future development.

Meeting community health needs

The conference dealt with public health nursing as part of the total effort to meet community health needs. Professor Fraser Brockington, Director of the Department of Social and Preventive Medicine at the University of Manchester, England, set the scene in a brief sketch of the history of public health in Europe. He attributed the comparatively late development of public health to five major factors: lack of scientific knowledge; failure of the authorities to recognize their obligation to apply available knowledge for the protection of the public; absence of what may be called social conscience, which makes health for *all* not just for certain privileged groups; the objective weakness of the value system which does not accord health its proper importance; and finally lack of organization of responsible people and of trained staff. Professor Brockington said: "Public health as a form of treatment for ills of human society and as a means to promote community health is a recipe consisting of many ingredients in the compounding of which human societies have exhibited their own individual characteristics. Some have made a better prescription than others, but none until recent times are even approaching completeness." He described the role of the public health nurse in different types of service and he called attention to the necessity for public health to change and adapt itself to the circumstances in which it finds itself.

Despite a considerable diversity in conditions affecting health care among the countries of Europe, certain general and almost universal trends are discernible, including an ageing population with a consequent increase in chronic illness; an increase in mental illness, partly a product of the tensions and tempo of today; greater density and higher speeds of motor traffic calling for emphasis on accident prevention; an increase in the influence of mass communications, which can be an important factor in health education; and such sociological trends as increased industrialization and the greater emancipation of women, which have profound effects on family and community life. All of these must be taken into account in assessing health needs and planning programmes to meet them. Further medical and social progress must be considered as Miss Elizabeth Hilborn, WHO Consultant in Public Health Nursing, emphasized.

Medical and social sciences have developed far beyond the community's present ability to apply them. Knowledge of growth and development processes and of the emotional and social factors in health have pointed up the need for considering emotional as well as physical causes of illness for programmes which will control fear and insecurity as well as disease-causing bacteria and for supportive and counselling services which will assist people in finding solutions for their own problems. Each day brings new scientific knowledge which makes eradication of certain diseases a practical possibility and which points the way to the prevention or control of other illnesses which were once felt to be hopeless.

In some countries, environmental sanitation, communicable diseases and infant and maternal mortality still demand priority in health programmes. In other countries, these basic problems have been met well enough so that attention can be turned to such matters as the prevention and treatment of mental disease, the prevention and early treatment of cancer, the control of chronic diseases, occupational health services, accident prevention, the problems of ageing, physical, psychological and social

rehabilitation expanded health education radiation hazards etc. The assignment of priorities depends on the urgency of the respective needs, the level of public education and readiness of the people for action and the financial and personnel resources available. Frequent assessment of the situation is essential in order to keep pace with changing conditions and medical and social advances.

Planning services to meet health needs requires first and foremost co-ordinated leadership preferably by a government authority. Decentralization is also desirable, however, planning must be undertaken at the local level by people familiar with the local situation and able to assume the requisite responsibility. The key members of the health team—usually the physician, the public health nurse and the sanitary engineer—should all have a part in administrative planning.

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Because of her close contact with the inhabitants of a community the public health nurse is able to make a valuable

contribution to the planning of health activities and services. She is effective as a fact finder in epidemiological investigations and other field studies, is a two-way public relations agent and an interpreter and enforcer of health laws and regulations. She often must serve in a managerial supervisory or administrative capacity.

Functions such as the above require of the public health nurse certain personal qualities which are difficult to define. Although she usually has to work within the framework of regulations—which tends to imply rigidity—she must exhibit great flexibility in the performance of her many and varied tasks.

There was general agreement among the participants in the conference that public health nursing is most effective in the form of a polyvalent service concentrating on the family rather than the individual and providing both curative and preventive care. A proper balance between the two types of care is more easily achieved if auxiliary nursing personnel can be used as members of the polyvalent nursing team. Nurses trained for specialized services may serve as consultants to their general practice colleagues. Such consultation plus good supervision can do much to ensure high professional competence in a general nursing programme.

Since the nurse must co-operate with the physician, the social worker and the family, the role of each should be clearly defined and should be understood and respected by the others. The public health nurse should be regarded as a collaborator rather than a subordinate of the physician whose functions she complements. It is important that general medical practitioners should participate more actively in public health work and the public health nurse can facilitate this by making personal contacts with physicians in her area or with the local medical association.

The role of the hospital is changing, its services are becoming more comprehensive and its relationships with outside health agencies are being strengthened. The goal is continuity in the care of the individual patient carried through from the hospital to the home and achieved by co-operation

between the hospital and the public health service.

The conference dealt at considerable length with the administration of public health nursing services. The importance of efficient administration is enhanced by the shortage of personnel, the needs of expanding programmes and the increased demands made on nurses. Nurses with administrative ability must be used to the best possible advantage. Good supervisors must be found and auxiliary personnel must be trained in order to extend the services of the professional nurse.

An administrative problem of particular concern is that of providing public health nursing services for widely scattered rural populations. Special inducements to lure nurses to rural posts may be required such as salary differentials or provision of housing, or it may be necessary to make service in a rural area for a limited time a prerequisite for practice in other localities.

In rural areas public health services should be decentralized as much as possible in order to be in close contact with the people served, whereas hospital services should be centralized because of the difficulties of adequately staffing and equipping a number of small establishments.

Education for public health nursing

Whether public health nurses in a particular country can best be trained by a basic or post basic programme depends upon the quality and potentialities of the basic training school, the stage of development of public health nursing services in the country and the responsibilities which the public health nurse is expected to assume at the outset of her career. In any training programme planned and supervised field experience is most important, but throughout the practical part of her training the student nurse must be permitted to retain her student status. Advanced education is necessary for those who are to occupy administrative supervisory consultative or teaching positions. As indicated above, consideration should be given to the training of auxiliary personnel.

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Evaluation in public health nursing

Both programme and performance must be subjected to constant appraisal if public health nursing services are to be improved.

The first step in any formal evaluation of a programme is to define the objectives of that programme. The information necessary to determine how well the existing services are meeting the defined objectives should

then be collected. The findings will indicate changes that need to be made.

Evaluation of the performance of the individual nurse serves two purposes: it provides an objective basis for administrative action such as promotion, transfer, dismissal, selection for additional training, etc. and it aids in the education and development of the nurse herself. Such an evaluation is essentially part of the supervisory process in which the nurse and her supervisor exchange experience, analyse their tasks and plan together for the improvement of the service.

The participants in the conference agreed that a public health nursing service will grow in effectiveness to the extent that its members are able to appraise their programmes and their own work critically and to change as change is indicated.

HEALTH CONDITIONS IN THE AMERICAS

The population of the Americas is increasing rapidly and characteristically nearly all countries and areas have a young population in many of them over 40% of the inhabitants are under 15 years of age. Several different patterns are discernible in the principal causes of death recorded during the years 1953-1956. In the United States, Canada, Argentina and Uruguay, and also in Hawaii and Jamaica, the two leading causes of death were diseases of the heart and malignant neoplasms, which are diseases of the older age groups. In many other countries the leading causes affecting mainly younger age groups were gastroenteritis, malaria, influenza, pneumonia, tuberculosis and certain diseases of infancy, but their relative importance varied from country to country. In some countries many deaths were caused by communicable diseases such as typhoid fever, syphilis, whooping cough and measles. Avitaminoses and other metabolic diseases and anaemias were also responsible for many deaths and relatively high death rates in certain countries.

Many infant deaths are not recorded and definitions of causes of death are often not comparable from country to country. Nevertheless, the available data show that infant death rates are high in many areas. During 1956, for example, death rates in the neonatal period varied from around 20 to 40 per 1000 live births, but in the post-neonatal period they varied from 5 to 83. This greater variation after the neonatal period is to be expected for neonatal deaths are on the whole due to conditions present at birth and therefore largely unalterable, whereas post-neonatal deaths are due principally to environmental conditions and have been almost eliminated in some countries. There are wide variations in the death rates recorded for infective and parasitic diseases, respiratory diseases and digestive diseases; in many countries these are very high, indicating the need for improving environmental conditions.

The usual pattern of mortality among infants and children is of high rates in infancy followed by lower rates in childhood, with

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The usual pattern of mortality among infants and children is of high rates in infancy followed by lower rates in childhood, with

the lowest in the life span found in the age group 10-14 years. For the years 1953-1956 infective and parasitic diseases, respiratory diseases and digestive diseases accounted for over two thirds of deaths in early childhood (1-4 years) in countries with high death rates in this age group but for less than a third in countries where the corresponding rates are low. In the countries with low death rates accidents claimed the largest toll of deaths followed by influenza and pneumonia combined then by congenital malformations and malignant neoplasms. In countries with high death rates on the other hand gastritis enteritis etc took first place followed by influenza and pneumonia and other infective and parasitic diseases. Malaria was a principal cause in 5 countries and one other area. Avitaminoses and other metabolic diseases appeared also as a principal cause in 5 countries and 3 other areas even though the certification of deficiency diseases is known to be incomplete.

In later childhood (5-14 years) accidents took first place as cause of death in 14 out of the 21 countries and other areas for which information was available. In many however communicable diseases such as malaria and tuberculosis and gastritis enteritis etc were principal causes of death.

Communicable diseases are prominent as causes of death at all ages. Although the incidence of diphtheria has continued to decline in several countries and other areas in 1956 approximately 12 000 cases were reported and in 8 countries and 2 other areas the rates were in excess of 10 per 100 000 population.

In one country and 4 other areas the number of new cases of leprosy reported in 1956 exceeded 10 per 100 000 population. Although the number of reported cases has declined in some countries and areas in a few there were more in the period 1953-1956 than there had been in the period 1950-1952 and it is expected that even more cases will be reported when diagnostic and treatment facilities are extended. The number of known cases of leprosy in the Americas exceeds 100 000 with cases in nearly all countries and other areas but the actual

number of cases is much larger and may be twice as large.

There are marked variations in the numbers of cases of malaria reported by year and by area. Nevertheless nearly 600 000 new cases were reported in 1955. Malaria is therefore a major health problem and an extensive malaria eradication programme is now under way in the hemisphere.¹

Cases of plague were reported from only 6 countries in the Americas during the years 1953-1957. In 1957 there were in all 154 cases. Campaigns are in progress to eliminate vectors and reservoirs of the disease.

In Canada and the United States combined the poliomyelitis case rates were over 20 per 100 000 population in the years 1949-1950 and 1952-1954. Vaccination programmes were started in these countries in 1955 and extended in 1956 and the case rates per 100 000 fell to 8.6 in 1956 and 3.3 in 1957. In the rest of the Americas the rate was 1.5 per 100 000 in 1947 but steady increases in the number of reported cases in some countries and outbreaks of the disease in others resulted in case rates of more than 4 per 100 000 for the years 1953-1956.

✓ Practically all the cases of smallpox in the Americas during the period 1953-1957 were reported from 9 countries in South America. In 1950 the XIIIth Pan American Sanitary Conference had recommended a systematic vaccination programme aimed at the eventual eradication of the disease. Although great progress has been made eradication has yet to be completed in 7 countries of South America and 5604 cases were reported in 1957.

The number of cases of syphilis throughout the hemisphere (nearly a quarter of a million in 1956) is high enough to show that this remains a major health problem in spite of the successes attending its treatment. In many countries there has been a continuous decline in the case rates but in others there have been fluctuations from year to year the result perhaps of variations in case finding procedures.

The large number of cases of tuberculosis

recorded between 1953 and 1956 indicates that cases were conscientiously diagnosed and reported to the health authorities variations and especially increases in the numbers are probably a reflection of changes in case finding activities In several countries and other areas including Canada the United States Venezuela and Puerto Rico the consistent decline in the case rates was probably due to a true reduction in the incidence of the disease

Typhoid fever still presents a considerable problem with some 40 000 cases annually in the period 1953-1956 and an incidence of over 50 per 100 000 population in Chile Colombia El Salvador Peru British Guiana French Guiana Antigua Martinique and Dominica Epidemic typhus on the other hand is declining with only 746 cases in 1957 which is less than a third of the number reported in 1953

Whooping cough is still a major cause of death in infancy in some countries and the case rates for the disease are still high in many areas Judging by the number of reported cases (227 000 in 1956) and the death rates whooping cough presents a much greater problem than diphtheria

In Haiti a yaws eradication programme is going on and the number of reported cases fell from 82 735 in 1950 to 1074 in 1956 Elsewhere in the Americas marked reductions have been noted In 1956 approximately 14 million people in 8 countries and 9 other areas were affected with yaws

Between 1953 and 1957 there were 271 fatal 55 non fatal and 3 unspecified cases of yellow fever reported all as jungle yellow fever except for 3 cases of urban yellow fever in Trinidad in 1954 In 1956 more than 2 000 000 vaccinations were reported The eradication of *Aedes aegypti* is one of the four eradication programmes in progress*

The incidence of disease is related to environmental sanitation and a well-developed and co-ordinated programme of health improvement requires information on such matters as water supplies and sewage disposal Data are available in respect of the

whole national territory for only 13 countries in which the population served by a water supply system varied from slightly over 10 / 10 75 / during 1956 Over half the urban population was served by water supply systems in 8 of the 11 countries for which the relevant data are available In most countries the population served in rural areas was either small or not known Data regarding sewage disposal are far from complete but in 1956 several countries and other areas had over half the population without sanitary facilities

Health improvement also depends on whether medical and health personnel health services and hospital facilities are available to a sufficient degree As was to be expected there are wide variations in the numbers of physicians available In 1957 Argentina Canada Cuba the United States and Uruguay each had 10 physicians or more per 10 000 population but 12 countries had less than 3 per 10 000 In most countries the number of dentists veterinary surgeons sanitary engineers nurses and other auxiliary medical personnel was relatively small

The general picture of health conditions in the Americas over the years 1953-1956 is one of progress in many fields especially in the eradication and control of communicable diseases But much remains to be done Many infants and young children still die from preventable disease environmental conditions and sanitation require special attention more doctors nurses and other health workers are needed in many countries Nevertheless comparison with the situation of a decade or two ago will show what immense strides have been made

A comprehensive report on health conditions in the Americas for the years 1953-1956 has been published by the Pan American Sanitary Bureau (PASB)² which serves as the WHO Regional Office for the Americas This report was prepared for the XVth Pan American Sanitary Conference and from it were drawn the details given above

COMMUNICABLE DISEASES IN AFRICA SOME FACTS AND FIGURES

The control of the communicable diseases continues to be the most urgent task of the public health services in Africa. The article that follows is a summary of recent reports from the WHO Regional Office for Africa on progress in the control of brucellosis, leprosy, tuberculosis and yaws.

Brucellosis

For several years WHO, FAO and the Commission for Technical Co-operation in Africa (CCTA) have been greatly concerned about the ravages of brucellosis in cattle in Africa and the possible repercussions on human health. In June 1958 a seminar on brucellosis was held by these three organizations at Elisabethville, Belgian Congo. It was attended by about 30 specialists from 12 countries and territories who discussed the various aspects of the disease including identification, epidemiology and measures for its control. The following facts and figures emerged in the course of the seminar.

In many parts of the African continent the problem of brucellosis is closely linked with that of nomadic cattle. In southern Angola, for example, herds in search of water and good pastures cover enormous distances during the dry season when outbreaks of epizootic abortion due to brucellosis are most liable to occur. A mobile brigade of inspection had therefore been set up by the veterinary services to keep a watch on the situation.

About 17% of the 12 000 to 13 000 dairy cattle in the south of the Belgian Congo are infected and cases of brucellosis have been found among Africans in the cattle raising areas. Veterinarians are working on the problem in close contact with physicians and many of the cattle have been inoculated against the disease.

Some 200 cases of human brucellosis are diagnosed in Kenya every year, as compared with between 20 and 30 cases in Uganda and Tanganyika. No cases occur in Zanzibar.

In Uganda up to 15% of the milk yield of cows and goats is infected.

In French Equatorial Africa where the disease exists among nomadic cattle in the Lake Chad area, epizootic abortion is rare. A few cases of brucellosis are found among people living in close contact with the herds.

Brucellosis control started in Mozambique in 1953 and about 150 000 doses of vaccine have been distributed there to date. A mobile unit has counted up to 200 000 infected cows representing about 7% of the total number of cattle. In Nigeria the problem is complicated by the fact that large numbers of the population live in close contact with livestock; a special effort is being made to deal with it by inoculation of calves and pasteurization of milk.

In British Somaliland a very large proportion (about one third) of patients in hospital are infected with brucellosis. Men and animals live in close contact in this territory where goats are often kept in family dwellings.

No case of human brucellosis has been reported in Southern Rhodesia for many years and the infection rate among cattle raised by Europeans does not exceed 10%. Widespread inoculation of cattle is carried out.

In the Union of South Africa inoculation is also widespread and 80% of the dairy cattle in the Johannesburg area are protected by compulsory vaccination. Vaccine produced in Onderstepoort is exported to other African countries and territories.

Finally, there are occasional cases of human brucellosis in northern Bechuanaland.

Leprosy

Some 2 300 000 cases of leprosy—or about a quarter of the world wide total—are to be found in Africa south of the Sahara. Half of these cases are already being treated with sulfones and it is expected that treatment will be extended to all leprosy cases in the Region within the next few years. The percentage of “neutralized” patients—i.e. those who have been rendered non-contagious—is already very high and although the treatment takes some time the risks of reinfection are relatively low. It is therefore reasonable to hope that the present generation of Africans will be the last to suffer from the disease to any large extent.

Mass antileprosy campaigns in French Equatorial Africa started in 1953 and have been assisted by WHO and UNICEF since January 1956. The weekly or fortnightly administration of sulfones either orally or by injections is carried out by mobile units. Those who cannot be reached by the units are treated in fixed centres or leprosy villages. Of the 145 000 cases recorded in the area up to July 1958, 91 700 are receiving regular treatment, more than 20 300 cases are now considered as neutralized. As the lepromatous form of the disease—the most malignant—is rare in French Equatorial Africa where it affects only 7% of patients, the outlook for the eradication of leprosy from the area is most promising.

The campaign in French Equatorial Africa has served as a pattern for activities in French West Africa where some 290 mobile units have been formed for the detection and treatment of leprosy. About 300 000 cases out of a probable total of 400 000 had been recorded by September 1957. Early in 1958 UNICEF donated 46 million sulfone tablets and supplied 90 motor vehicles and 200 bicycles for use in the campaign.

Case finding surveys in the French Cameroons have revealed some 26 600 cases of leprosy of which 18 000 have been or are being treated, 13 700 of them regularly. The total number of cases is estimated at 50 000. Of the 36 motorized treatment units which have been set up, 19 are equipped by UNICEF.

The leprosy control campaign in Gambia started in August 1957. The total number of cases is estimated at 10 000 of which a quarter were under treatment in June 1958. The small area of the territory permits treatment to be carried out in existing fixed health centres.

In Ghana, 36 000 cases of leprosy were treated and 300 neutralized between March and December 1957. Fixed treatment centres are supplemented by 12 mobile teams, 9 of which have been equipped with Landrovers by UNICEF.

Nigeria was the first African country to use sulfones in the treatment of leprosy. When the antileprosy campaign began in 1951 the number of leprosy cases in the country was estimated at 500 000, but recent surveys indicate that 700 000 would be nearer the mark. WHO and UNICEF assistance to the campaign started in 1954 and about 219 000 cases had been treated by the end of 1957. Treatment is given mostly in fixed centres, to some of which mobile teams are attached and in leprosy villages.

Sulfones have also been widely used in the treatment of leprosy in the Belgian Congo, Spanish Guinea and the Union of South Africa for several years. In Uganda a campaign to set up leprosy villages near dispensaries or hospitals began in 1957 while an antileprosy campaign is to be started in Sierra Leone this year.

UNICEF has already promised more than \$2½ million in material assistance to antileprosy campaigns in Africa for the period 1958–1960. WHO will continue to give technical advice and supply consultants for these campaigns as well as granting fellowships to antileprosy workers from the African Region.

Tuberculosis

Tuberculosis surveys undertaken by WHO teams in Africa during the past few years have thrown new light on the prevalence of the disease in various parts of the continent¹. In some countries, e.g. Nigeria, the situation does not seem to be so serious as

¹ See also *Ch on Wld Hlth Org*, 1958, 12, 353.

had been feared. Elsewhere however the disease has been found to be more wide spread than was formerly thought e.g. in British Somaliland where more than 2/ of the adult population are believed to be affected. By 30 June 1958 over 50 000 persons in the African Region had been examined by WHO tuberculosis teams.

It is estimated that in Basutoland about 3000 persons out of a total population of 600 000 are suffering from infectious tuberculosis. A mass control campaign is being planned in a pilot area containing 20 000 inhabitants; it will be extended as soon as the form of treatment most suited to the territory has been ascertained.

In Bechuanaland about 3000 persons—i.e. 1% of the population—are infectious cases. Treatment and vaccination are serious problems in this territory since a large part of the population is semi-nomadic.

In Kenya a mass survey and treatment campaign covering between 120 000 and 140 000 people started in Nairobi in January 1959. This is the largest antituberculosis campaign to be undertaken in the African Region so far.

The rate of positive reactions to tuberculin tests in Mauritius exceeds 50% in certain groups. Here as elsewhere in Africa the incidence of the disease is higher in urban than in rural areas. The mortality rate for pulmonary tuberculosis which had started to decline in 1952–1953 when isoniazide treatment began became stable in 1955–1956 and was slightly on the increase in 1957. Between July 1951 and December 1957 over 70 000 children and young people were vaccinated by the island's tuberculosis control services.

The prevalence of tuberculosis in St Helena is very low and it should be possible to eradicate the disease from the island completely by means of mass BCG vaccination combined with domiciliary treatment of all infectious and potential cases.

Surveys in Swaziland have indicated the presence of 2400 infectious cases, i.e. a prevalence rate of 1%. As it would be impossible to treat all cases in hospital they will receive domiciliary drug treatment

regularly for a year; follow up care will be given by health visitors.

Yaws

During the past few years over 18 million people have been examined in yaws control campaigns in Africa south of the Sahara and 9 million have received treatment. The campaigns have been assisted and co-ordinated by WHO and UNICEF.

In French West Africa 5 territories are covered by yaws control campaigns. Between October 1956 and September 1958 over 2 070 000 people were examined of whom about 1 858 000 were treated. In many areas 80% of the population have come forward for examination and treatment with excellent results. In some places the percentage of active cases has fallen from 13 to 0.012.

Campaigns in Ghana started in 1955 and by the end of June 1948 almost 2 816 900 people had been examined and 1 231 000 treated. The initial treatment survey has been completed in the northern part of the country and is continuing elsewhere. By 30 September 1958 over 400 000 people had been examined in resurveys.

An initial treatment survey of Liberia was completed by the end of October 1957. More than 769 300 people were examined and about 146 900 or 19% were found to be suffering from yaws. Resurveys covering the whole population were carried out between July 1957 and October 1958 of the 831 150 people examined less than 4% were affected by the disease and in many districts the prevalence was much lower. Possibilities of reinfection are being closely watched and it is hoped that Liberia will be completely free from yaws in the not too distant future.

With assistance from WHO and UNICEF the Government of Nigeria started a mass yaws control campaign in 1954. To date some 12 million people have been examined and 5 million have received treatment. As in campaigns in other parts of Africa a single dose of penicillin (from 2 to 4 ml according to age) is administered to patients and half

For details on the 5 to of the camp g west m
Nigeria, see p 96. S Iso Ch Wd Illh O g 1957
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that dose to lat nt cases and contacts. On an average about 100 000 injections are given monthly. About 500 people including 5 doctors are fully employed in the campaign.

In Sierra Leone the average yaws infection rate varies between 7/ and 8/. By 31 July 1958 almost 597 900 people had been examined and 78 000 cases of yaws had been found and treated. During resurveys 170 100 people were examined among whom 9100 cases were reported.

The campaign against yaws in French Togoland is drawing to a close. The second resurvey is now under way and there will be

a third and final one. Over 30 000 people were examined in September 1958 alone.

Mass control campaigns are shortly to be launched in the various territories of French Equatorial Africa where it is expected that some 340 000 cases will be treated.

If the present rate of progress can be maintained yaws should cease to be a major health problem in the Region within the next few years. Vigilance will not be relaxed however since it is planned to continue yaws control in the form of surveillance and preventive work by the general public health services.

A NEW LIGHT ON PSITTACOSIS

Psittacosis can by no stretch of the imagination be said to rank as a great epidemic scourge. The reported outbreaks of this respiratory virus disease though dramatic enough in their lethality have not been sufficiently extensive to give it prominence as a public health problem. Nevertheless to the people stricken the physicians concerned with treatment the diagnostic and public health laboratories and the health authorities responsible for tracing the source and checking the spread of an outbreak it is a disease that causes no little concern. And there is now reason to believe that it is considerably more widespread than was once supposed and will call for more complicated control measures in the future.

It was at one time generally thought that psittacosis was as its name would suggest contracted by man only through contact with infected parrots parakeets and other psittacine birds. Today however as a result of improved serodiagnostic techniques it is known that many non psittacine birds—turkeys ducks chickens pigeons and even gulls and sparrows—are also naturally susceptible to infection with the psittacosis virus and capable of passing it on to any human being with whom they come into contact. The fresh light that this discovery has shed

on psittacosis—and on ornithosis the name given to its counterpart in non psittacine birds—is reviewed in a recent article by Dr K. F. Meyer of the George Williams Hooper Foundation University of California San Francisco Calif. USA.¹

Dr Meyer points out that just under half of the 98 species of birds which have so far been found to harbour the psittacosis virus are non psittacine. The vast reservoir of natural infection represented by poultry and pigeons greatly increases the chances of spread of the disease. The risk of infection once believed to be confined to people associated in some way with rare or pet psittacine birds is now known to extend to many other people—pigeon fanciers poultry farmers employees at poultry processing plants home processors of poultry and so on. Furthermore since the infection can be transmitted indirectly through droppings and feathers even free flying birds such as wild pigeons and gulls must be considered a potential danger.

The unspectacular frequency of psittacosis recorded in the past was probably partly due to the difficulty of diagnosis. If there

¹ Meyer K. F. (1959) Some general remarks on psittacosis and ornithosis. *Bull. Wild Hlth Org.* 29: 101.

was no clear evidence of the patient's association with some psittacine bird or with some person known to be infected a case of psittacosis was quite likely to be reported merely as a respiratory infection of unknown origin. The improvement of serological techniques in recent years has immensely simplified the diagnosis of the disease both in humans and in birds. While admitting the value of serological tests Dr Meyer stresses however that isolation of the virus from the suspect bird or patient will remain the ultimate diagnostic criterion.

The ability of birds to resist infection varies: some can withstand massive injections of virus readily destroy it and never become carriers; others may succumb to small doses or recover but continue to harbour the virus in their organs for many months. Dr Meyer suggests that since resistance is determined by constitutional factors it should be possible through selective breeding to develop strains of birds that will not acquire a non-sterile immunity so eminent a source of persistent infection in aviaries and poultry flocks. The possibility of inducing immunity in flocks by vaccination with inactivated virus suspensions is being investigated. The results of preliminary trials have been reasonably encouraging but it remains to be seen whether large scale immunization would be practicable.

The advent of the broad spectrum antibiotics has robbed human psittacosis of much of its lethal power. Prompt administration of large doses (2 g daily) of one of the tetracycline compounds will often bring about an immediate clinical improvement and prolonged treatment will usually prevent relapse formerly an all too common feature of the disease. These compounds are effective too in suppressing active infection in birds and even in some cases in ridding them of the virus completely. Addition of tetracycline compounds to the feed under carefully controlled conditions has led to the eradication of carriers from a few parakeet aviaries and would seem to indicate a promising line of approach to the control of infection in poultry farms. But the results of studies carried out on pigeons and turkeys have so

far been disappointing. The large quantities of antibiotic (about 100 mg per kg of body weight) required to guarantee an adequate concentration in the blood of turkeys would make the method prohibitively expensive and moreover even with such doses there would be no certainty that all the birds would be freed of infection since the food intake of sick turkeys is poor and erratic. At the moment therefore the prospects for the chemoprophylaxis of ornithosis are not bright. Continuous feeding of antibiotics in low dosage might prevent clinical attacks caused by a virus of low virulence but would probably prove ineffective against highly virulent strains and might moreover encourage the development of drug-resistant strains. Still as Dr Meyer says there is yet hope that some effective means of applying antibiotic therapy will be devised.

The control of psittacosis is manifestly no mere matter of preventing the movement of infected birds from one country to another. In every country there is a potential reservoir of infection in the native bird population. The problem to be solved is twofold: how to stop outbreaks among birds from spreading either to other birds or to man, and how to eliminate the latent infection in the bird population. In the case of free-flying birds it is a virtually insoluble problem. In the case of poultry however, although the mode of spread is not yet fully understood, there are a number of measures that can be taken. In describing these measures Dr Meyer emphasizes the importance of the early isolation of sick birds as a means of checking the spread of disease through a flock. Only too often the infection goes unnoticed until the birds reach the processing plant with the result that employees at such plants are frequently in danger of contracting the disease. Here Dr Meyer adds a word of warning. The very understandable and growing tendency on the part of plant operators to refuse to handle suspect flocks may lead unscrupulous poultry raisers to sell their birds through other channels rather than lose money on them and this may bring under risk of infection all those who prepare birds for the table in their own

homes. He feels therefore that the health of home processors should be watched carefully especially after it is known that a local processing plant has rejected a flock.

Mass vaccination and administration of antibiotics may both prove useful weapons in the fight against psittacosis. But the final answer to the control problem will only come through the earnest co-operation and vigilance of pet bird traders, poultry farmers

processors and distributors, pigeon fanciers and loft operators, agricultural agencies, general practitioners and veterinarians and public health authorities. If these diverse groups of people are all constantly on the alert for signs of the infection it should be possible through timely intervention to stop outbreaks of the disease among birds both from endangering the health of the public and from bringing economic disaster in their train.

Reports of Expert Groups

ATARACTIC AND HALLUCINOGENIC DRUGS IN PSYCHIATRY

There has been a notable growth of interest in recent years in the effect of drugs on mental function in man. This has been due in large measure to the discovery of the marked mental disturbances of an hallucinatory character caused by lysergic acid diethylamide ($LS D_2$) and to the emergence of the so-called tranquillizing drugs from the antihistamine compounds and the Rauwolfia alkaloids. A Study Group on Ataractic and Hallucinogenic Drugs in Psychiatry was convened by WHO in November 1957 to examine some aspects of the problems raised by these psychotropic drugs which are used not only in mental hospitals throughout the world but also to an increasing degree in general practice and in the community as a whole and to suggest the most fruitful lines of enquiry into a subject which is as yet only very imperfectly understood. The Group had before it a large number of papers contributed by its members on such diverse topics as the properties of psychotropic drugs, the relations of drug induced mental changes to psychoanalytic theory and the role of psychotropic drugs in group therapy¹. Its report was partly based on these and on the paper entitled "Psychotropic drugs: observations on current views and future problems" by Dr J. Elkes, Professor of Experimental

Psychiatry at the University of Birmingham, England, who was present as a consultant at the Group's meetings.

The report giving the Study Group's conclusions² outlines the reasons for the present lack of knowledge about these drugs, some of which have long been employed in religious and ceremonial customs in some parts of the world. One of these reasons is the essentially personal and subjective nature of some of their effects. This is a field of enquiry far removed from that of the objective and measurable phenomena which nineteenth century science on the whole regarded as solely worthy of consideration. In this respect it is akin to the field of psychoanalysis which was at first greeted with silence, doubt and disapproval. Another reason for neglect of these drugs is the uneven development of animal behavioural sciences in which investigation concentrated on the cognitive rather than on the affective aspect of the animal. Yet another lies in the uneven development of the basic neurological sciences for it is only in the past two decades that electron microscopy and X-ray diffraction have provided knowledge of the submicroscopic structure of the functional units of the nervous system and microchemical analysis has shown

WHO Stud. Group A. ataractic and Hallucinogenic
Drugs Psychiatry (1958) R. p. (Hid. H. h. Org. te. An. R. p.
Ser. N. 13) 37 p. Price 3/6 30/60 Sw. 1/2.

Some of these papers will be published later in the Bull. of
the World Health Organization.

the chemical differences between various areas of the brain. Knowledge such as this is a prerequisite to the understanding of the chemical targets of the ataractic and hallucinogenic drugs. Only very recently too has an attempt been made to bring together neurophysiological experiment and information theory which was originally developed to meet the needs of research into weapons but has an obvious bearing upon the functioning of the nervous system.

The report examines the part played in behaviour by the hypothalamus, the ascending reticular system and the limbic system, cerebral subcortical centres now known to control patterns of emotional expression and the effect on them of the psychotropic drugs and proposes a very provisional classification of these drugs in the light of their effects into major tranquilizers, minor tranquilizers, hypnosedatives and tranquillisedatives, anti-acetylcholine drugs with marked psychotropic effects, stimulants and hallucinogenic agents. The classification is necessarily provisional because of the extremely wide range of action of these hallucinogenic drugs and because it is based on experimental laboratory data which at this stage can only be tenuously related to clinical effects. The relation of drug-induced mental changes to psychoanalytic theory is then discussed and the value of the drugs in psychotherapy.

The psychotropic drugs have altered the management and treatment of certain types of psychotic patients in mental hospitals, enabled many chronic patients to leave the hospitals and receive treatment as outpatients and in individual cases made rehabilitation a possibility. The report notes, however, that the choice of drugs in treatment has been essentially empirical and that no clear and detailed criteria have guided the investigators in their trials. Nevertheless the management of overtly disturbed patients has been greatly simplified and thus the Group thinks might well mean that the patients in such cases are perhaps for the first time accessible to individual and group influences from which a defensive pathological process has hitherto shielded

them. The report suggests that this offers totally unexplored opportunities in both individual and group psychotherapy and discusses the fresh outlook and skills required of investigators into this new situation, the need for more investigators not only inside but also outside the ranks of medical men, the effect on the functional pattern and even the layout of the mental hospital and the problems posed by the use of these drugs in different cultural settings. Mental illness in a country like Nigeria, for example, does not follow quite the same patterns as in Europe or America; moreover the use of psychotropic drugs in the less developed countries seems to be distinguished from their use in the more developed by the unusually low incidence of toxic manifestations among patients being treated.

There are great difficulties in developing methods for the investigation of the effects of psychotropic drugs. Among these difficulties are individual variations in reaction, the so-called "placebo response", the absence of uniform terms to describe the phenomena observed (so that ambiguity is the rule) and the assessment of the non-verbal element present in the clinical state under observation. The report discusses these difficulties and ways to overcome them. The selection of observers in the Group's opinion lies at the very core of any trial of a drug and it should be carried out with meticulous care. The design of the trial should itself fulfil certain requirements.

The report then examines the public health aspects of the use of psychotropic drugs. With regard to the question whether they have led to a reduction in the numbers of patients in mental hospitals, it discusses the multiplicity of factors which can produce change in the numbers, concludes that the answer is as yet unknown and stresses the need for controlled studies to assess the therapeutic efficacy of the drugs. The necessary data to form a judgement can be obtained only by epidemiological, sociological and social psychological studies, the technique of which is as yet at an early stage of development. Similar studies should also be made of out-patient psychiatry.

clinics and of general practice for the mentally ill in hospital form only a part of the mentally ill population of a country. Because of their relatively short history the report notes it is difficult to predict whether the psychotropic drugs will continue to be widely used and, if so, what effect they will have on the health

of the community. The public health authorities should however be aware of their potential hazards and take steps to obtain the necessary knowledge about these drugs and their use by the studies suggested which should be carried out over a sufficiently long period and in a variety of settings.

NUCLEAR ENERGY MEDICAL TRAINING AND PUBLIC HEALTH

Nuclear energy and medical studies

The use of the Geiger Muller counter the determination of the half life of an isotope the use of isotopes in specific tracer experiments on animals and the damage to chromosomes caused by ionizing radiations are a few of the many subjects with which the medical student will have to be familiar in future. Such knowledge cannot be acquired by the mere reading of popular works however good these may be. Nor will the student be satisfied with occasional references by his teachers to the "potentially pathogenic effects of ionizing radiations." What he will obviously need above all is a sound knowledge of nuclear physics. One of the first practical conclusions to be drawn therefore is that in many countries a much more thorough training in mathematics will have to be provided. Secondly in physics as taught during the first years of medical studies equal emphasis has hitherto been laid on all the classic branches such as mechanics the properties of matter heat sound light electricity and magnetism. From now on there should be a change in the emphasis placed on these subjects and particular attention should be paid to the study of electrical and nuclear phenomena in their many forms.

The organization of theoretical courses in these subjects should not in general cause

any particular problem. On the other hand the organization of practical experiments and demonstrations in nuclear physics (with out which the students might become discouraged) calls for a new approach. In the past a regrettable isolation has often separated the students in the medical faculty from their contemporaries in the other scientific departments of the university and this has sometimes had the unfortunate result that senior men engaged in research and teaching in the more advanced fields of physics and chemistry have undesirably underrated the abilities of medical students in general and have relegated their tuition to junior colleagues. That a relationship between teacher and taught which originates in this way should frequently engender an undesirable atmosphere—especially among young and impressionable students during their first experience of university life—is quite understandable and there are grounds for believing that a certain lack of sympathy towards the basic sciences which can often be encountered in older medical practitioners represents the latent reciprocation of this early uncongenial association. Today fortunately a larger number of the senior teachers of physics and chemistry at universities—perhaps through a greater sense of social responsibility—are prepared to co-operate more cordially with their colleagues in medical schools and in most instances where this more liberal attitude has appeared those responsible for the education of medical students have responded cordially to the opportunity. For it is only through the kind collaboration of those in charge of larger physics laboratories that such apparatus as

WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel (1958) Fourth report on the status of the medical professions in the public health service of the World Health Organization. Ser. N. 154; 33 pages (price 3/6, 80/60 S. f. 2.—). Fifth report on the status of the medical professions in the World Health Organization. Ser. N. 155; 2 pages (price 1/6, 80/30 S. f. 1.—). Also published in French and Spanish.

the chemical differences between various areas of the brain. Knowledge such as this is a prerequisite to the understanding of the chemical targets of the ataractic and hallucinogenic drugs. Only very recently too has an attempt been made to bring together neurophysiological experiment and information theory which was originally developed to meet the needs of research into weapons but has an obvious bearing upon the functioning of the nervous system.

The report examines the part played in behaviour by the hypothalamus, the ascending reticular system and the limbic system, cerebral subcortical centres now known to control patterns of emotional expression and the effect on them of the psychotropic drugs and proposes a very provisional classification of these drugs in the light of their effects into major tranquilizers, minor tranquilizers, hypnosedatives and tranquillo-sedatives, anti-acetylcholine drugs with marked psychotropic effects, stimulants and hallucinogenic agents. The classification is necessarily provisional because of the extremely wide range of action of these hallucinogenic drugs and because it is based on experimental laboratory data which at this stage can only be tenuously related to clinical effects. The relation of drug-induced mental changes to psychoanalytic theory is then discussed and the value of the drugs in psychotherapy.

The psychotropic drugs have altered the management and treatment of certain types of psychotic patients in mental hospitals, enabled many chronic patients to leave the hospitals and receive treatment as outpatients and in individual cases made rehabilitation a possibility. The report notes, however, that the choice of drugs in treatment has been essentially empirical and that no clear and detailed criteria have guided the investigators in their trials. Nevertheless the management of overtly disturbed patients has been greatly simplified and this the Group thinks might well mean that the patients in such cases are perhaps for the first time accessible to individual and group influences from which a defensive pathological process has hitherto shielded

them. The report suggests that this offers totally unexplored opportunities in both individual and group psychotherapy and discusses the fresh outlook and skills required of investigators into this new situation, the need for more investigators not only inside but also outside the ranks of medical men, the effect on the functional pattern and even the layout of the mental hospital and the problems posed by the use of these drugs in different cultural settings. Mental illness in a country like Nigeria, for example, does not follow quite the same patterns as in Europe or America; moreover the use of psychotropic drugs in the less developed countries seems to be distinguished from their use in the more developed by the unusually low incidence of toxic manifestations among patients being treated.

There are great difficulties in developing methods for the investigation of the effects of psychotropic drugs. Among these difficulties are individual variations in reaction, the so-called placebo response, the absence of uniform terms to describe the phenomena observed (so that ambiguity is the rule) and the assessment of the non-verbal element present in the clinical state under observation. The report discusses these difficulties and ways to overcome them. The selection of observers in the Group's opinion lies at the very core of any trial of a drug and it should be carried out with meticulous care. The design of the trial should itself fulfil certain requirements.

The report then examines the public health aspects of the use of psychotropic drugs. With regard to the question whether they have led to a reduction in the numbers of patients in mental hospitals, it discusses the multiplicity of factors which can produce change in the numbers, concludes that the answer is as yet unknown and stresses the need for controlled studies to assess the therapeutic efficacy of the drugs. The necessary data to form a judgement can be obtained only by epidemiological, sociological and social psychological studies, the technique of which is as yet at an early stage of development. Similar studies should also be made of out-patient psychiatric

body irradiation it is necessary to know the hazards of internal contamination by radio active substances—hazards which are increasing with the growing use of radio active elements in research diagnosis and therapy and also with the accumulation of radio-active waste from nuclear fission.

This instruction on radiation pathology will be given during the clinical period and it would seem desirable to organize a special course on radiation medicine within the radiological services. Such a course would refresh the student's previously acquired knowledge of physics he would be taught the numerous and interesting uses of radiation and his attention would be constantly drawn to the dangers of their incorrect utilization—thus being all the more important in that isotopes are being used increasingly in clinical examinations so that radiation hazards are not confined to radiology and radiotherapy. Additional precautions are necessary in the handling of these radio-active substances. The student will also have to become acquainted with the clinical features of the acute serious possibly fatal syndrome caused by whole body irradiation.

Of all the scientific problems which the use of nuclear radiation raises the most serious and alarming is undoubtedly that of its genetic effects. During the clinical period therefore a short time should be devoted to a fresh study of genetics from the point of view of the relationship between disease and acquired mutations in human population groups. The role of heredity as an etiological agent should be dealt with, wherever appropriate by all teachers giving clinical instruction. During the medical course great emphasis should be laid on genetic hazards and in this connexion diagnostic and therapeutic radiology services will bear a heavy responsibility.

Nuclear energy and public health

Sources of atomic energy constitute a risk not only to those engaged in the production of such energy but also to people living near these sources. This risk is too small however to justify relinquishing one of the

most powerful means of improving human well being. Nevertheless it raises new public health problems. Sources of atomic energy, the utilization of ionizing radiations and radio-active isotopes and the accumulation of large quantities of radio-active waste are all factors calling for preventive action for which public health workers as a whole must be trained. Two examples will suffice to demonstrate the kind of role such personnel may have to play.

No definite conclusions have yet been arrived at with regard to the possibility of preserving food and sterilizing equipment by means of radiation but this method may prove to be of great practical interest. It has been found that all types of food can be sterilized by cathode rays (electrons) and although some physical and chemical changes are generally noted new techniques such as irradiation at low temperatures and low oxygen tension may reduce radiation sensitivity in foodstuffs which in any case irradiation preserves for a much longer period. This industrial application however raises such problems as (1) the effect irradiated foods may have upon the health of the general population including toxic effects if any (2) the necessity to develop an analytical test comparable to the phosphatase test for determining the adequacy of pasteurization of milk to indicate whether adequate radiation has been provided (3) the possibility that food may tend to spoil more rapidly following subsequent exposure to bacterial infection owing to the destruction of protective factors affected by irradiation.

The second example is the disposal of radio-active waste. Solid waste can be incinerated buried in the ground or dumped in the sea. Weakly radio active liquid waste can be discharged into the main sewers. There remains the much more difficult problem of treatment of highly radio-active waste. Up to the present time tank storage has been the method most commonly employed and there has so far been no serious accident. Nevertheless if nuclear power stations are to be constructed near large centres of population the precautions taken will certainly have to be reinforced.

that effecting particle acceleration isotope preparation and micro wave emission can be seen in operation. In fact the days are over when the necessary equipment for the teaching of medical physics was at the disposal of any school of medicine.

If instruction in nuclear physics is to be effective study courses must provide also for revision and amplification of the basic knowledge already acquired and ensure that the student has a clear idea of the bio physical properties of radiations. In the study of ionizing radiations—which are by far the most important in pathology—special attention should be paid to the ionization density they produce along their paths and the depth to which they penetrate various kinds of tissues. In this connexion the study of alpha and beta rays is of particular importance since it is to these that living tissues are most likely to be exposed at the present time. Nevertheless since proton and neutron radiations may also shortly come into more general therapeutic use these too must be dealt with.

When he is familiar with the various types of radiation the student will have to learn to distinguish the units which are generally used for measuring their intensities and their biological effects. Methods of detecting and measuring radiations are based mainly on their ionizing effect: radiations add or remove peripheral electrons when they impinge on atoms in the absorbing medium. This ionizing property is especially significant in aqueous media such as those encountered in living cells in which profound changes may be induced. The total amount of ionization is related to the energy absorbed (34 electron volts per ion pair in a gas) so that methods for the detection and measurement of radiations are based largely on this property. It is not always easy in the first instance to grasp the differences between the various methods of measurement. For example the total energy absorbed may be measured and this gives the rad which is a unit of radiation dose in terms of the amount of energy absorbed per gram of tissue or other matter. A rad is the quantity of radiation which is associated with the

absorption of 100 ergs of energy per gram of substance. On the other hand the number of nuclear events may be measured and this gives the curie which is a unit of radio activity defined as the quantity of any radioactive nuclide in which the number of disintegrations per second is 37×10^{10} (approximately the number of atomic disintegrations per second occurring in one gram of radium). The difference between rad and roentgen should be made clear: the latter is a unit of measurement of ionizing radiation and should in principle be applied only to X or gamma radiation. A roentgen (r) is defined as the quantity of X or gamma radiation the associated corpuscular emission of which produces per 0.001293 grams of air ions carrying one electrostatic unit of electricity of either sign.

In addition to measurement the question of dosage must also be dealt with—total body dose, depth dose etc. In order to demonstrate the difference between pharmacological doses and the exposure doses so far employed in radiology it may be pointed out for example that the LD₅₀ of tetanus toxin for a dog is about one million times that for a mouse whereas the radiological LD₅₀ is with respect to X rays the same for both animals.

Although rapid progress has been made in nuclear physics there are still gaps in our knowledge of the biological effects of radiations. These effects are made complex by a number of factors such as the difficulty of defining disturbances in delicate cellular processes whose normal mechanism is still not fully understood, the difficulty of accurately assessing the dose absorbed by the tissues, the special sensitivity of complex organisms like the human body to ionizing radiations. For example a dose of 600 roentgens which might be fatal in whole body irradiation corresponds to an accrued energy scarcely equivalent to that resulting from the normal metabolism of body tissues during a few seconds. Nevertheless students must know the essential characteristics of the tissue changes brought about by ionizing radiations. In addition to possible sequelae after prolonged local irradiation and whole

personnel should be encouraged to perceive the educational possibilities of their daily work and should be shown how to incorporate in it effective health education for the individuals and communities in their charge.

Those most concerned are private practitioners in medicine and dentistry, public health, sanitary and social workers of all types, hospital personnel including administrators, dietitians, physiotherapists and other specialized workers and industrial health teams. The Committee felt that certain workers in related fields such as school teaching, home economics, agricultural extension services and fundamental education and community development should also have the opportunity of appropriate training in health education by virtue of the important contribution they can make. The achievement of the trained health worker is most significant when it forms part of a well integrated whole and is related to the activities of the rest of the community.

The Committee made recommendations as to the type of training suitable for various categories of personnel. Special mention was made of the role of auxiliary health

workers who have a particular usefulness in imparting health information and in raising standards since they are often in even closer contact with the people than are their professional counterparts. Their initial training should therefore place considerable emphasis on this aspect of their work. Demonstration practice and field exercise should form a large part of the training programme and regular refresher courses will be valuable in maintaining interest and skill. It was further emphasized that a new cadre of health education specialists is needed to assist with the planning and conduct of health education training and to provide technical leadership in the organization of health education activities. The preparation given such specialists would be designed to provide a fundamental understanding of the basic social sciences and of the principles and methods of education. It should aim at the establishment of professional standards of integrity and skill.

The importance of the relation of workers in health education both with the public and with other members of the health team is great and their ethical responsibility profound. The highest standards can best be assured by careful selection and training.

MEDICAL REHABILITATION

The preservation of a healthy society may be said to comprise four phases—the promotion of health, the prevention of disease, the treatment of disease and medical rehabilitation. Until recently WHO has been less concerned with the last phase than with the prevention of diseases and injuries likely to lead to permanent disability. Of late, however, an increasing attempt has been made to develop means of physical, vocational and social rehabilitation and it seemed desirable that expert advice should be obtained on how the Organization might best contribute to the furtherance of health in this field. The WHO Expert Committee on Medical Rehabilitation therefore met to consider from the medical viewpoint the concept and principles

of rehabilitation and the organization of appropriate services for the handicapped, with special reference to the social and economic conditions peculiar to different countries.

The Committee's opinion is embodied in a recently published report¹ which considers in detail what is already being done for the handicapped person and how far it actually meets his newly defined needs. The basic aim of rehabilitation is the maximum development of the disabled person's physical and mental functions. One of the Human Rights proclaimed by the United Nations

¹ WHO Expert Committee on Medical Rehabilitation (1958). *Final Report*. 2nd H. A. Org. ex. R. Ser. N. 158. 54 pages. Price 3.6 \$0.60 Sw. fr. 2.— Also published in French. d. S. unsh.

From these two examples it will be realized that the members of the public health services will have to be responsible for many tasks such as the detection and assessment of radio active contamination of soil air and foodstuffs protection of personnel the control of the radio active substances themselves etc

These two examples also make it clear that health personnel may be required to engage in educational activities so as to inform the general public who react so strongly to any mention of atomic energy. People must be informed of the public health repercussions of the preservation of food by irradiation (which is of direct interest to them) of the presence of radio active waste in storage or buried in the ground etc. In fact the public information side of atomic energy is of paramount importance since the only way of reassuring people is to provide them with objective information.

It is obvious therefore that health personnel must have some knowledge of nuclear energy matters. Naturally the nurse will not be expected to have the same knowledge as that demanded of a medical officer of health so that elementary training courses for certain categories of staff will be just as necessary as more advanced or specialized training. The courses will all cover physical and biological principles fairly thoroughly.

They will also deal with the applications of nuclear energy and radiation the risks involved and the protective measures which must be applied the level of instruction given varying with the nature of the course.

Governments ministerial departments educational authorities and the general public must be made to understand that there can be no effective protection against the dangers of atomic energy unless medical and health workers receive appropriate training. Both the reports on which this article is based emphasize that one of the essential prerequisites for such training is the better teaching of mathematics and physics in schools of all categories and in universities. Among other recommendations contained in the fourth report the final one—specially stressed by the Committee—is of great interest. In it the Committee suggests that in order to make information definitions and practical advice more readily available WHO should—with the co operation of the best experts available—publish a handbook to serve as a reference manual for public health workers.

There are a number of annexes to the two reports dealing in great detail with the subjects to be covered by courses on nuclear energy. These annexes might well be consulted from now on for the organization of undergraduate or post graduate training.

HEALTH EDUCATION

Health education is not merely health propaganda or instruction. It aims at enabling the learner to make his own choices and decisions about health matters. With the expansion of public health campaigns it has become apparent that the success of specific health programmes depends on the active participation of a well informed public. Professional and auxiliary health workers who are in close contact with a wide variety of people should develop the ability to educate and influence them so that they can use to the full the technical

health services now becoming more widely available.

In the report of the WHO Expert Committee on Training of Health Personnel in Health Education of the Public¹ the needs and opportunities for such training are defined the health workers most concerned are indicated and the broad principles of content method organization and aims are stated. The Committee considers that health

¹ WHO Expert Committee on Training of Health Personnel in Health Education of the Public (1958) Report (World Health Organization, Geneva, 1958) 40 pages. Price 1/9 \$0.30 Sw. fr. 1.—Also published in French and Spanish.

NOTIFICATION OF COMMUNICABLE DISEASES A COMPARATIVE STUDY

Cases of communicable disease must be notified to the public health services so that preventive measures may be taken. Although the collaboration of medical practitioners is essential, it will be difficult to obtain if the public health services fail to take action when cases are notified, or merely use the notification for statistical purposes. On the other hand, if notification benefits their patients and the administrative burden involved is not too heavy, medical practitioners can reasonably be expected to collaborate. These considerations must be taken into account when laws and regulations on the notification of communicable diseases are being drafted or amended.

Among the earliest laws on the notification of communicable diseases were those of Norway (1860), the Netherlands (1872), Sweden (1875), Switzerland (1886), Italy (1888), the United Kingdom (1889), France (1893), Uruguay (1897), Japan (1897) and Chile (1899).

At the present time notification is required by law in almost all countries. The various diseases to be notified to the health authorities are not necessarily included in a single law. Tetanus, anthrax, or *oncosomiasis* may be notifiable pursuant to laws on the notification of occupational diseases, food poisoning pursuant to food hygiene laws, and tuberculosis, leprosy, malaria, and the venereal diseases pursuant to special laws dealing solely with those diseases.

A recent study in the *International Digest of Health Legislation*¹ surveys the legislation of some fifty countries, as well as that of

about a dozen territorial subdivisions of two countries with decentralized health administrations. The study is devoted solely to general laws on the notification of communicable diseases.

The list of notifiable diseases included in each law may be subdivided into classes, although this is not normally the case in the English-speaking countries. In France the diseases are classified according to whether their notification is compulsory or optional. In Syria there are also two classes of diseases which are notifiable throughout the Province and those whose notification may by order be made compulsory throughout the Province or in specified areas. In Venezuela a distinction is made between diseases which must be declared immediately and those which must be notified within five days. The Federal Republic of Germany and Austria each divide their lists into three classes: quarantinable diseases, other communicable diseases, and carriers. There are four classes in the German Democratic Republic and six in the Belgian Congo: i.e. quarantinable diseases, epidemic diseases, endemic diseases, food poisoning, other communicable diseases of an epidemic nature (malaria, bilharziasis, etc.), and deficiency diseases in general. Non-communicable diseases such as lead poisoning and beriberi are sometimes found in the lists of notifiable diseases. The Italian list also contains six classes: the first relating to diseases notifiable in the population in general and the others to certain special cases (scabies and ringworm in school children, venereal diseases in hospitals and among prostitutes, tuberculosis in hospitals and among domestic servants, etc.).

¹ See *I. Dig. Hlth. Leg.* 1958, 9, 406. This survey will be issued in the form of an *Ann. (price 3 s. 6 d. 5 s. 2-)*.

is that of the individual to security in the event of disability in circumstances beyond his control. The Committee points out that it is essential to distinguish between the terms disability and impairment. Statistics of physical impairment (by which is understood the presence of a medically diagnosed physical defect in the individual which reduces his fitness to cope with the requirements of everyday life) exist for various countries but do not reflect the true prevalence of disability defined in the report as a complex evaluation of the reduction of the patient's ability as regards gainful employment. Much more and more precise information on this aspect is required for a thorough assessment of the scope and effectiveness of existing methods of medical rehabilitation but the first steps in developing rehabilitation programmes to meet present needs should not be deferred on this account.

Questions of specialized but not limited interest such as the psychological aspects of rehabilitation and the problems characterizing the organization of services in the less developed countries are fully treated in the report. The Committee stresses that early rehabilitation is of psychological as well as physical importance and that physicians have a particular responsibility to urge patients towards rapid acceptance and readjustment to the factors in the situation and personality of the patient which most affect this mental process are discussed in an annex. In the less developed countries the planning problem is complicated by the very high prevalence of certain handicapping conditions by the level of development of the general medical and social services and by the need to relate the rehabilitation services to the social and cultural pattern. Such countries often have a very limited range of employments open to those with a permanent partial physical disability. Suggestions for

surmounting some of these difficulties in the setting up of services for the disabled are made in an annex devoted to this question.

The Committee recommends for further study and action preliminary investigations aimed at standardizing terminology, assessing the nature of the rehabilitation problem in various countries, determining how existing social security services may be co-ordinated with rehabilitation machinery, revising some aspects of technical and medical training programmes and developing techniques for assisting not only the orthopaedically handicapped and those with impairment of the special senses but the even more frequent cases of disability arising from circulatory, respiratory and digestive disorders.

Since the basis of the concept of rehabilitation is that medical cure should be followed by social cure, it is clear that co-operative programme planning is necessary between medical, public health, education, welfare, social security, employment and voluntary organizations throughout the service at the levels of national policy, of local administration and of immediate application to the individual. Liaison between physicians, hospitals and health departments would be invaluable for case-finding purposes and local administrative machinery should not be allowed to impede personal contact among the medical, social and rehabilitation workers and their patients. As the Committee concludes, perhaps one of the greatest problems to be faced is that of reconciling the demands of organization with the needs of simple humanity as expressed in the care of the individual patient. By its analysis of the fundamental features of this branch of public health, the report should help to bring about a rationalization in the planning of medical rehabilitation services in whatever background they may develop.

Notes and News

Identification in brucellosis

One of the difficulties about *Brucella* the causative organism of brucellosis is the confusingly large number of strains that have been reported in various places and from various animal species. The result is that very often the species of *Brucella* concerned is in doubt. In 1950 the Joint FAO/WHO Expert Panel on Brucellosis recommended that type strains of *Brucella* be exchanged between certain laboratories and an attempt made to identify the species. This exchange was carried out and in 1952 the Joint FAO/WHO Expert Committee on Brucellosis discussed the work done and the reports submitted on identification methods noting that most strains when freshly isolated had all the characteristics biochemical and serological of one or other of the recognized *Brucella* species. There were however certain strains with other combinations of characteristics and the Committee felt that monospecific sera would be an aid in typing them provided satisfactory sera were available. But it was not easy to prepare such sera and there were no hard and fast rules which if followed would guarantee a satisfactory product.

Among the strains which the Committee decided should be designated as type strains was *Br. abortus* 544 (Weybridge) and from the Central Veterinary Laboratory Weybridge, England which produced this strain comes a report on a method for the preparation of reliable monospecific *Brucella* sera.¹ Large volumes of sera have been prepared at the Laboratory for distribution to laboratories throughout the world which wish to type *Brucella* cultures or compare their sera with those of Weybridge.

The report describes the method developed at Weybridge in detail the author expressing the hope that it might encourage other

laboratories to employ serological typing as well as biochemical tests for the identification of species.

Vaccination for brucellosis

In the vaccination of cattle against brucellosis an attenuated strain *Brucella abortus* strain 19 is widely used because of its high immunizing power and low virulence. This strain has also been used in human beings to confer immunity but some authorities have reservations concerning this method. Consequently research on the use of dead vaccines for human immunization is continuing.

A preliminary report has been published on a recent attempt in the United States to gauge the value of a dead vaccine in human beings.² Adult male volunteers were selected at random and given an intradermal test with a standard dose of brucellergen blood samples were taken at the same time to ascertain the presence of detectable antibody and a month later to compare with the previous results. About 14% of the volunteers were sensitive to the test and about half of these had systemic reactions as well. On the other hand the results of the blood tests a month later showed that the use of the allergic skin test did not cause a rise in antibodies or stimulate the phagocytic activity of the blood even in those cases where it had caused an allergic response. It did not therefore confuse the picture for later investigations.

The individuals negative to the skin test were injected intramuscularly with either killed *Brucella* vaccine half with alum precipitated vaccine half with the vaccine in saline. The injections were repeated six months later for the first group and one month and six months later for the second. After the first injection both groups had

In certain countries and territories for example Finland Japan Hong Kong and Viet Nam only about 15 diseases are notifiable. On the other hand lists containing between 60 and 70 diseases are found in Czechoslovakia Honduras and parts of the United States (Iowa and Colorado). Most lists however contain between 20 and 30 diseases. The terms used to describe diseases are often vague sometimes referring only to a symptom or a morbid entity of a general nature for example diarrhoea meningitis or encephalitis without being more specific. The definition of puerperal fever varies. In some countries it is defined as a febrile condition occurring in a woman within 21 days of childbirth or miscarriage in which a temperature of 38 C or more has been sustained during a period of 48 hours or has recurred during that period; in others it is defined as any febrile condition occurring in a woman in whom a temperature of 38 C or more has occurred within 14 days of childbirth or miscarriage.

The notification of carriers is rarely required. Where it is the carriers mentioned are usually those of typhoid and paratyphoid fevers and less often of bacillary dysentery and diphtheria. In Quebec Canada all carriers are reportable to the health authorities since they are classified as patients suffering from one of the notifiable communicable diseases.

In some countries householders may be obliged to notify cases of communicable disease. In France this obligation was at first confined to medical practitioners but was subsequently extended to the principal occupier—head of the family or establishment—of the premises in which the patient lay and in default thereof in the following order to the spouse the nearest ascendant of the patient or any other person residing with

him or caring for him. In Germany on the other hand notification was originally required of the head of the household in the first place; medical practitioners were later made primarily responsible. In the United Kingdom the notification of certain diseases is the responsibility of both the principal occupier and the medical practitioner in attendance but in practice it usually falls to the medical practitioner.

Notification is normally required within 24 hours but the time limit may be 12 hours (Alberta Canada) or 48 hours (Portugal) or for certain diseases 5 days (Venezuela). Most countries require the quarantinable diseases to be notified immediately by telephone or by telegram. Notification is of course normally made to the health authorities; in some countries other civil authorities must be informed as well.

Variations such as those mentioned above may exist not only between countries but also within countries which have decentralized health administrations. In Switzerland a large measure of uniformity in notification procedure has been achieved by means of a federal law that applies to all the cantons. In the United States of America and Canada the lack of uniform procedure has led to attempts to establish basic principles for laws and regulations on the subject. Similar attempts have also been made on the international level.

The subject matter of the study is arranged under the following headings: introduction, legislation, classification of notifiable communicable diseases, list of notifiable diseases, notification of carriers, when notification must be made, who must make notification, to whom notification must be made, conclusion. Appendix A: notifiable communicable diseases and other conditions. Appendix B: forms prescribed for notification. Bibliographical references.

The first draft of the guide was considered by a representative group of nurses meeting in Tokyo in 1957 and was subsequently sent to selected nurses in various parts of the world for further review and suggestions. A second draft incorporating many of the suggestions received has been made available to a certain number of persons and institutions so that the value of the guide may be tested in practice. In 1960 after a year's trial the possibility of a general distribution of the guide will be considered.

Persons and institutions interested in trying out the guide may obtain copies on application to the Nursing Section World Health Organization Palais des Nations Geneva Switzerland

Study tours in North America and the USSR

A nine week study tour of poliomyelitis centres in Canada and the United States of America was recently organized by the Pan American Sanitary Bureau which serves as the WHO Regional Office for the Americas for virologists from Austria Chile French Equatorial Africa Lebanon Nigeria Poland the United Arab Republic (Province of Egypt) and the USSR. The programme of the tour which took place between October and December 1958 included training and observation at public health laboratories in Montreal Montgomery Ala and Atlanta Ga visits to three pharmaceutical companies producing poliomyelitis vaccine in Detroit Mich and Indianapolis Ind and study and observation of the safety and potency testing of poliomyelitis vaccines at the National Institutes of Health in Washington D C

A group of 23 public health administrators from various parts of the world took part in a WHO sponsored study tour of the USSR from 15 October to 24 November 1958. The aim of the tour which included visits to medical and health centres in Moscow Leningrad Kiev the Georgian SSR and the Uzbek SSR was to acquaint the participants with public health administration methods and problems in the USSR.

Malaria in the western Mediterranean countries

A technical meeting on malaria eradication in the western Mediterranean countries was held in Lisbon Portugal by the WHO Regional Office for Europe from 24 to 27 September 1958 following the meeting of the WHO Expert Committee on Malaria (see Chronicle November 1958). The following countries were represented France (for Algeria) Italy Morocco Portugal and Spain.

The malaria situation in the European countries of the western Mediterranean is in general satisfactory the disease has been practically wiped out in Italy and Corsica and the eradication measures in Spain and Portugal have entered their final phase. In Algeria and Morocco however antimalaria operations do not yet cover all endemic areas but the health authorities wish to undertake eradication programmes as soon as possible along the lines suggested by the WHO Expert Committee on Malaria and with WHO assistance.

In order to speed up eradication of the disease Portugal and Spain have decided to organize active surveillance services in areas particularly exposed to the risk of malaria owing to seasonal concentrations of workers or the presence of a few residual cases. The meeting stressed the danger of the reintroduction of malaria into countries with active eradication services by immigrants from overseas territories where the services are not yet adequate. It was noted that no evidence of mosquito resistance to DDT had been observed in any of the countries represented at the meeting.

Inter Regional Leprosy Conference

An Inter Regional Leprosy Conference was held under WHO auspices at the Institute of Hospital Administration Tokyo Japan from 20 to 24 November 1958. The following countries and territories in the South East Asia Eastern Mediterranean and Western Pacific Regions were represented: Burma Ceylon Fiji French Settlements in Oceania Hong Kong India Indonesia Iran Japan Korea Federation of Malaya Pakistan Territory of Papua and New Guinea Philip-

slight to moderate local soreness and about 17/ had systemic reactions in the form of raised temperature malaise and headache but after the other injections systemic reactions were practically non-existent. The blood was tested at two monthly intervals and it was found that there was a rise in antibodies and in phagocytic activity which tended to decline towards the end of the six month period. Post vaccination serum from the volunteers protected mice from a lethal dose of *Br abortus* whereas prevaccination serum did not.

Blood was taken after the booster dose of vaccine injected six months later and both the antibody level and phagocytic activity had gone up again. The study of the immunological response of the volunteers is being continued.

Yaws control in western Nigeria

Five million cases of yaws have been treated in Nigeria during a mass campaign launched in 1954 by the Federal Government with WHO and UNICEF assistance. The following details on the organization and progress of the campaign in the Owo Division of western Nigeria are based on a report by Dr J Fraisse, WHO Senior Medical Officer to the Nigerian Yaws Control Project.

Owo is one of the four Divisions of the Ondo Province and has a population of almost 250 300. The initial yaws treatment survey in this Division which began in February 1955 and ended in March 1956 was carried out by a medical field unit consisting of a medical officer and 20 assistants. Of the persons examined (78/ of the total population) 106/ were found to have active yaws and were treated on the spot. Six months after the initial treatment survey began ten yaws scouts were recruited locally and given six weeks training. They were then ready to start resurveys under the supervision of a leader and two assistants from the team which carried out the initial treatment survey. The resurveys were made on a house to house basis and on the spot treatment was given to all active cases and contacts.

Three resurveys were carried out between October 1955 and July 1958 each of them lasting about nine months. Each time the proportion of cases was found to have dropped as follows:

	$\frac{P}{100}$ of the
Initial treatment survey	10.6
First resurvey	1.3
Second resurvey	0.9
Third resurvey	0.1

The last resurvey covered about 88% of the total population.

In August 1958 systematic resurveys were discontinued and local centres took over the detection and treatment of cases. Each of the yaws scouts has now been assigned to one of ten fixed yaws treatment centres with the responsibility of carrying out house to house surveys in the area it serves and of directing active cases to the local dispensary for treatment. The dispensaries are visited once a fortnight by the leader of the former resurvey team who keeps a record of all cases diagnosed and treated and takes any steps that may be necessary to eliminate remaining foci of the disease. These duties will eventually be taken over by the local Rural Medical Officer. It is hoped that this method of supervision will lead before very long to the eradication of yaws from the Division and that it will be possible in the meantime to train the yaws scouts in a wider range of health activities so that they may form the nucleus of a permanent auxiliary medical staff.

Planning basic nursing education programmes

Although the number of qualified nurses is steadily growing it is not keeping pace with the demand for nursing services. Nursing responsibilities have increased and many countries are reorganizing or developing their nursing education programmes. WHO has therefore prepared a guide for nurses in a position to influence the planning of basic nursing education particularly in countries where modern concepts of nursing and nursing education are just beginning to develop.

FAO UNICEF UNRWA the Arab League and the Rockefeller Foundation were represented. The seminar which was the first of its kind to be sponsored by WHO in the Eastern Mediterranean Region discussed the place of health education in health programmes and its contribution to their success and reviewed health education achievements in the various countries and territories of the Region.

Improving hospital services

The large hospital is by far the most complex branch of the medical services. It is also the most expensive and year by year becomes more expensive still. At the same time the demand for hospital services is growing not only as a result of the general increase in population but because of the development of medical and social services for the public. In many countries the combination of rising costs and increased demand has produced a hospital crisis.

In Poland for example the provision of free treatment has led to a greatly increased demand for hospital services and the number of hospital beds per 1000 population rose from 2 in 1938 to almost 5 in 1956. This figure is however still considered inadequate. In England and Wales where the number of hospital beds per 1000 population is more than twice as large the average waiting time for general surgical cases before admission to hospital was 53 days in 1956¹ and by the end of the year there was a total of 431 000 names on the hospitals waiting lists. In Sweden during 1956 the average number of persons in hospital on any one day amounted to 1.3 / of the population.

As medical knowledge advances hospital equipment becomes more complex and new staff members are continually required to apply new specialities. As a hospital is in operation for 24 hours a day improved working conditions (e.g. shorter working hours) also mean larger staffs. Thus in certain hospitals in the United States of

America the number of staff per 100 patients rose from 156 to 213 between 1946 and 1956 and it is estimated that the cost of hospital care in the United States increases by 5.9 / every year. In the Helsinki General Hospital Finland the daily cost per patient rose by 11 / between 1955 and 1956.

Ways of dealing with these problems were considered at a meeting on the improvement of hospital services in Europe which was held in Stockholm by the WHO Regional Office for Europe from 3 to 13 November 1958. The meeting was attended by some 60 medical practitioners, clinicians, hospital administrators, nurses and social workers representing the following countries: Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, USSR and Yugoslavia. The principal questions discussed were: assessment of the efficiency of hospital services; services needed by the community (out-patient services, services at home, emergency services, etc.); health education of patients and their relatives; financial aspects (comparison between costs of domiciliary and in-patient hospital services); public relations; training of administrators and other staff.

The status of auxiliary nurses

Several countries faced with the shortage of trained nurses have been employing auxiliaries for various nursing tasks. Public health leaders now feel that it is necessary to assess the need for auxiliaries and to define their functions and categories and the content and duration of their training.

A Conference on Auxiliary Nursing was held under WHO auspices in New Delhi, India from 3 to 15 November 1958. It was attended by senior nurses and nursing administrators from the 12 following countries: Afghanistan, Burma, Ceylon, India, Indonesia, Iran, Japan, Pakistan, Sudan, Taiwan (China), Thailand and the United Arab Republic (Province of Egypt).

¹ This figure does not cover teaching hospitals, for which in periods are generally longer.

pinas Taiwan (China) Thailand and Viet Nam

The main subjects of discussion were epidemiological surveys leprosy control services (treatment prevention training of staff health education assessment of results) and rehabilitation (development of surgery and physiotherapy social aspects) Reports on recent advances in various fields of leprology and the progress of internationally assisted leprosy control projects were presented by consultants invited by WHO for the purpose

Filariaasis in South East Asia

Valuable research in the field of filariaasis has been carried out in India during the past few years and there is hope that effective medical control of the disease may become possible Work by the Indian Council of Medical Research in the States of Orissa and Kerala has given particularly useful results and in implementation of recommendations arising from the Orissa studies the Government of India organized 22 filariaasis survey units as part of its first five year plan These units—each of which covers a population of 300 000—have now nearly completed their work and 38 control units are in operation A training programme was also started and to date 70 medical officers and over 100 inspectors have been trained Progress in the fight against filariaasis has also been made in Ceylon where the disease is reported to be no longer a problem in rural areas

In October November 1958 filariaasis experts from Burma Ceylon India Indonesia and Thailand spent four weeks visiting filariaasis control centres and programmes in India and Ceylon under WHO auspices It is hoped that their report on this study tour will stimulate action against the disease throughout South East Asia

Training of health physicists

A five week course in health physics held at the Indian Department of Atomic Energy Bombay in November December

1958 was attended by 27 physicists and physicians from the South East Asia Region and 4 from the Western Pacific Region Designed for physicists and others who will serve as supervisors and instructors in radiation protection the course was sponsored by the Government of India and WHO with the co operation of the US Atomic Energy Commission The Director of the course was Dr Elda E Anderson of the Oak Ridge Laboratory Tenn USA who had previously directed international courses for health physicists held under WHO auspices in Belgium and Sweden¹

Health education in the Eastern Mediterranean Region

During the past few years an increasing number of countries and territories in the Eastern Mediterranean Region have come to recognize the value of health education of the public In seven of them health education divisions or departments have been incorporated in the public health services

Health education programmes in the Region have had striking results In Cyprus for example health education by general practitioners has been to a great extent responsible for a drop in infant mortality from 66 deaths per 1000 live births in 1947 to 31 deaths per 1000 in 1957 In Ispahan Iran the inhabitants believed that the use of the public shower baths was contrary to the tenets of their religion but were dissuaded from this opinion by a health education campaign in which the religious authorities took part In the Sudan health education has been extremely successful in obtaining the co operation of the public in antimalaria campaigns

A seminar on the health education of the public was held in Teheran Iran under WHO auspices from 28 October to 9 November 1958 It was attended by some 40 sanitarians physicians and professors from 14 countries and territories in the Eastern Mediterranean Region A number of inter governmental and private organizations including UNESCO

FAO UNICEF UNRWA the Arab League and the Rockefeller Foundation were represented. The seminar which was the first of its kind to be sponsored by WHO in the Eastern Mediterranean Region discussed the place of health education in health programmes and its contribution to their success and reviewed health education achievements in the various countries and territories of the Region.

Improving hospital services

The large hospital is by far the most complex branch of the medical services. It is also the most expensive and year by year becomes more expensive still. At the same time the demand for hospital services is growing not only as a result of the general increase in population but because of the development of medical and social services for the public. In many countries the combination of rising costs and increased demand has produced a hospital crisis.

In Poland, for example the provision of free treatment has led to a greatly increased demand for hospital services and the number of hospital beds per 1000 population rose from 2 in 1938 to almost 5 in 1956. This figure is however still considered inadequate. In England and Wales where the number of hospital beds per 1000 population is more than twice as large the average waiting time for general surgical cases before admission to hospital was 53 days in 1956¹ and by the end of the year there was a total of 431 000 names on the hospitals waiting lists. In Sweden during 1956 the average number of persons in hospital on any one day amounted to 1.3% of the population.

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¹ The figure does not cover teaching hospitals, for which waiting periods are generally longer.

The Conference recommended a course of basic training to permit auxiliaries to act as assistant nurses and suggested that full nursing training should be made available to auxiliary nurses who had qualified in the basic course. It was the general feeling of the Conference that auxiliary nursing personnel are permanent and essential members of the health team and that this fact needs to be accepted both by professional health workers and the public.

Asian seminar on mental health and family life

The physical, emotional and social well being of the individual and his family in relation to the changing conditions of modern life was the main topic of discussion at the first Asian seminar on mental health and family life which was held at Baguio, Philippines from 7 to 20 December 1958. The seminar was sponsored jointly by the Philippines Government (through the Family Life Workshop of the Philippines and the Philippine Mental Health Association), the World Health Organization, the World Federation for Mental Health and the Asia Foundation. It was attended by some 50 specialists in the fields of psychiatry, sociology, anthropology, public health, nursing and home economics. Seventeen Asian countries were represented.

The seminar gave participants an opportunity to exchange information on family life in their respective countries, taking into consideration the cultural, social, economic and other factors operating in different areas and to formulate general principles for ensuring the well being of the family as it adjusts itself to the changes that are taking place in Asia. The discussions were arranged to cover the psychological aspects of life from birth to old age, with special emphasis on basic Asian living patterns and their modification by changing conditions. An exhibition held in connexion with the seminar included photographs of typical Asian families, small models of typical houses and children's paintings. Documentary films were also presented.

Inter regional bilharziasis training course

An inter regional bilharziasis training course was held by WHO at the Endemic Disease Research Institute, Ministry of Public Health, Cairo, United Arab Republic from 10 November to 31 December 1958. It was attended by 24 medical officers, ecologists, engineers and sanitarians from 12 different countries. All WHO regions were represented with the exception of the European Region.

The aims of the course were to review the basic concepts of bilharziasis control and the latest developments in this field to make participants aware of the gaps in present knowledge and the need for further research and to enable them to carry out effective control programmes. The lectures and demonstrations covered epidemiology, diagnostic techniques, therapy, ecology of molluscan hosts with special reference to factors conditioning their habitat and breeding conditions, malacological techniques, control and evaluation procedures, water management with special reference to irrigation, environmental sanitation, socio-economic conditions and health education in relation to bilharziasis.

Industrial and occupational health

The rapid growth of industrialization in several countries of South East Asia has raised a number of new health problems which need to be tackled at an early stage. A Conference on Industrial and Occupational Health in South East Asia, sponsored jointly by WHO and ILO, was held in Calcutta, India from 24 November to 6 December 1958. The 31 participants in the Conference represented the following countries: Afghanistan, Burma, Ceylon, India, Indonesia and Thailand.

The Conference made a number of recommendations intended to guide the countries of the Region in the planning of adequate and co-ordinated health services for workers. These covered such aspects of the problem as financing, organization and training, health education of management and work.

ers legislation and co-operation between occupational health services and community health services

Specifications for food additives

It is usually impossible to eliminate all impurities from substances used as food additives. The establishment of maximum permissible levels for impurities in such substances was therefore discussed by the FAO/WHO Expert Committee on Food Additives which met in Rome from 1 to 8 December 1958. Three main points were taken into consideration in this connexion: the toxicity of the impurity, the quantity of the particular food additive likely to be consumed, and the possible effect of the impurity on food ingredients. The Committee drew up tentative specifications for a selected group of antimicrobials and antioxidants used as food additives, indicating methods of identifying the impurities and determining their maximum levels. Methods of assay were considered in conjunction with purity specifications, as the choice of method may depend on how far the possibility of the presence of interfering substances has been excluded.

Some of the chemicals used as food additives are also used for medical preparations and their specifications have been established in the various pharmacopoeias. In considering whether any deviations from these specifications could be recommended, three points were borne in mind: (a) chemicals used as food additives are always taken by mouth; (b) chemicals used as food additives will usually be ingested over a long period, even over a whole lifetime; (c) medicaments are taken under medical supervision, whereas there is no such control on food. The Committee also considered the question of preparing a reference book for food additives along the lines of the *Pharmacopoea Internationalis*.

The members of the Joint Committee were: Dr E. Boehm (United Kingdom), Dr R. A. Chapman (Canada), Professor A. C. Frazer (United Kingdom), Professor O. Högl (Switzerland), Dr W. MacNaughton (USA), Dr J. H. Mahoney (USA), Dr B. L. Oser (USA), Dr O. Pauli (Germany), Dr J. F. Reith (Netherlands), Professor S. W. Souci (Germany), Dr H. C. Spencer (USA), and Professor R. Truhaut (France). Dr I. Nir-Grosfeld (WHO) and Dr A. G. van Veen (FAO) were joint secretaries to the Committee.

People and Places

Institutional care of children

Towards the end of 1958, D. J. P. Boekhold of the Netherlands visited WHO Headquarters in Geneva, the WHO Regional Offices in Alexandria and New Delhi, and children's institutions in India, Iran, Pakistan and Syria to get the material for a study on the health aspects of the care of children deprived of normal home life. This study is being prepared at the request of UNICEF and will be presented to the next session of the UNICEF Executive Board, March 1959.

D. Boekhold has been Chief Health Officer for the Province of South Holland since 1944 and is in charge of a day-care centre for children in Leiden.

Mental health in Europe

As a contribution to World Health Day 1959, whose theme is 'Mental Illness and Mental Health in the World of Today', Herve Bazin, the well-known French writer, is preparing a study on developments in the prevention and treatment of mental diseases in Europe.

Mr Bazin is visiting psychiatric hospitals and mental health clinics in Belgium, Denmark, Germany, the Netherlands, Portugal, Switzerland, the United Kingdom and the USSR to gather material for his study.

WHO Area Representative for Nigeria

To establish effective co-operation with health authorities and an adequate coordination of WHO activities

with those of other health services in Nigeria the WHO Regional Office for Africa has appointed Dr A. D. Talec of France as Area Representative in that country. Dr Talec will have the task of studying the health needs of the area and keeping them under continuous review. This will enable him to help the authorities in co-ordinating all resources available for health thereby strengthening the national health administration and paving the way for the integration of internationally assisted health projects into the general national health programme.

A graduate of the Medical Faculty of the University of Bordeaux, Dr Talec comes to WHO from the Ministry of Public Health and Population, France, where he was Director of Health Services with responsibility for the organization and administration of public health services in French overseas territories. He has had more than twenty years' experience of public health work in Africa and South East Asia.

Health education in Israel

WHO has assigned a Visiting Professor to the Hadassah Medical School of the Hebrew University, Jerusalem, to help develop training and research programmes in health education. He will also advise the Government and other agencies on health education matters.

Mr Roy Stewart, Senior Lecturer in Health Education, University of Natal and Director of Health Education, Institute of Family and Community Health, Durban, Union of South Africa, has been selected for this assignment which will be for a period of two years, starting early in 1959.

Taiwan trachoma control campaign

An account of the WHO assisted trachoma control campaign in Taiwan (China) recently appeared in the Chronicle (November 1958). Dr Paolo Guerra of Italy is at present in Taiwan to assess the progress of the campaign and advise on its expansion and continuation.

Dr Guerra, who obtained his medical degree from the University of Turin, is Chief Ophthalmologist in the Federation of Ethiopia and Eritrea and a former Consultant Ophthalmologist to the High Commissioner for Health and Hygiene, Rome.

Training of occupational health workers

Professor E. W. Baader of the Institute of Occupational Health, Hamm, Germany, has been appointed WHO Visiting Professor at the Department of Occupational Health attached to the High Institute of Public Health, Alexandria, United Arab Republic, succeeding Professor Leonard J. Goldwater¹ and Professor Sven Forsman². He will spend three months at the Institute lecturing on industrial toxicology.

A toxicologist of international repute, Professor Baader is Honorary Professor of the Pathology of Occupational Diseases at the University of Münster and a former Director of the Institute of Occupational Diseases, University of Berlin.

Nursing appointment

Miss Mary L. Brice, the newly appointed WHO Country Nursing Adviser in Burma, will help the Burmese Government to extend and improve nursing and midwifery training services.

Miss Brice is a former Principal Sister Tutor at the Cheltenham Group Hospital and at the United Sheffield Hospitals, and has also held senior teaching posts at hospitals in Australia and Iran.

Environmental sanitation in Taiwan

During the past two years, WHO has been helping the Government of Taiwan (China) to plan storm drainage and sanitary sewerage systems for the city of Taipei. A WHO consultant, Dr H. Rohde, Chief Engineer and Deputy Director of the Ruhr River Association, Essen, Germany, recently went to Taiwan to review the work done in this connexion to date and to advise on the final plans and their implementation.

A graduate of the Technische Hochschule, Karlsruhe, Dr Rohde has had extensive experience in the design and construction of sewage treatment plants in Germany.

See Ch. *Wld Hlth O r* 1957 11 327
See Chro. *Wld Hlth O r* 1958 12 319

Review of WHO Publications

Bulletin of the World Health Organization
1958 Volume 19 Number 6 (pages 953-1134)

In the first article in this number of the Bulletin G Žarković & M Radovanović describe a survey carried out in 1956 to investigate the extent and epidemiology of endemic goitre in Bosnia and Herzegovina. A sample of 1/ of the population over 6 years of age was examined and the prevalence of goitre was found to be rather greater than had been supposed: one male in five and rather more than one female in three showing signs of the disease. No correlation could be established between the prevalence of goitre and the iodine content or degree of pollution of the drinking water. Some working hypotheses are offered in explanation of these findings.

J Hadjinicolaou contributes a study of the *Phlebotomus* populations in certain areas of Greece in the summer of 1957. Sandflies were found to have become practically extinct in all areas where systematic spraying with residual insecticides had been carried out since the vector control programme was started in 1946. On the other hand they were still plentiful in villages which had not been included in the programme and fairly plentiful in unsprayed towns and cities. Susceptibility tests on *P. papatasi* which was by far the predominating species in most places showed an LC_{50} for DDT of 0.78 at Athens and 0.75 at Chania in Crete; the LC_{50} for dieldrin was approximately 0.2.

A micro-agglutination test for the sero-diagnosis of Q fever is described by B Babudieri. Using the sera of sheep infected with Q fever the test was found to be approximately 10 times as sensitive as the capillary agglutination test and the macroscopic tube agglutination test and more than 20 times as sensitive as the complement fixation test.

In 1953-55 an investigation was carried out under the sponsorship of the Indian Council of Medical Research to determine the relative merits of the serological tests for syphilis used in eight major Indian laboratories. The results of this investigation are given in a report by R. V. Rajam. In each laboratory the Wassermann test, the Kahn standard test and the VDRL slide test were evaluated as to specificity, sensitivity and reproducibility. The VDRL test proved to be the most satisfactory on the average (specificity 97.6%, sensitivity 95.2%, reproducibility 87.2%) and the adoption of this test as the only routine serological test for syphilis in all laboratories in India is therefore recommended.

J. R. Busvine describes a simple method of measuring insecticide resistance in bed bugs. Batches of adult bugs are put on small pieces of filter paper impregnated with oil solutions of insecticides and mortality is estimated after 5 days at 25°C. In both *Cimex lectularius* and *C. hemipterus* two kinds of resistance can develop either independently or in conjunction. One involves DDT, methoxychlor and analogues; it cannot be overcome by the addition of DMC. The other involves γ -BHC, dieldrin and various other chlorinated cyclodiene insecticides. The resistance spectrum of bed bugs towards this group of compounds resembles those of *Anopheles gambiae* and *Musca domestica*, indicating similarity in the defence mechanism.

The behavioural resistance of *A. albimanus* to DDT was observed in populations on the Rio Chagres, Panama, by Trapido in 1952. A report on laboratory studies on this phenomenon which were carried out in 1958 is contributed by A. W. A. Brown. Measurement of the excitatory effect of DDT in inducing flight showed that the mean excitation times for engorged adults from the Chagres populations of Gatuncillo and Santa

Rosa were respectively significantly and almost significantly less than those for a population from an untreated area and for a laboratory population which had never encountered DDT. There was no difference in the susceptibility levels between the Gatuncillo the untreated and the laboratory strains when they were confined to DDT deposits for one hour.

Some recent observations made in Afghanistan, Ceylon and Burma on adults of *Anopheles cuersifacies* and *A. aconitus* are described by W. Buttiker. The specimens from Ceylon and Burma in particular showed a peculiar physiological process in which at the beginning of the dry season the coagulated dark red and almost desiccated stomach contents indicated a period of partial quiescence. As there were in most cases no signs of apparent growth of the fat body it appears that a hitherto undescribed form of physiological behaviour occurs under certain climatic and seasonal conditions.

Nozzle erosion can result in considerable economic loss to a malaria control programme owing to over application of insecticides. The factors responsible for increased discharge due to nozzle erosion may vary considerably. R. P. Loneragan and L. B. Hall describe a method of evaluating spray nozzles in accordance with the nozzle erosion conditions prevailing in any particular programme. This method had the advantage of requiring only two discharge rate determinations instead of a series.

Notes are included on the following subjects: the blood serum assay of the blood level duration test for oily injection of procaine penicillin (J. W. Lightbown, M. V. Mussett & D. Sulitzeanu); the significance of low titres in the sero agglutination test for brucellosis in cattle (O. Sandvik); causes of death in children in rural communities in Guatemala (M. Behar, W. Ascoli & N. S. Scrimshaw); resistance to DDT in *Anopheles stephensi* in southern Iraq (G. Gramiccia et al.); the susceptibility of adult female *Anopheles gambiae* to insecticides in East Africa (J. A. Armstrong); the inheritance of DDT resistance in *Aedes aegypti* (M. Qutubuddin);

insecticide susceptibility in certain anopheline lines in relation to season and temperature (M. Duport & M. Sandulesco); a pit shelter for mosquito sampling (R. C. Muirhead Thomson); exophily in anophelines in South East Asia (W. Buttiker); dieldrin resistance in *Cimex hemipterus* Fabricius (A. Smith); and culture methods for fleas (B. W. Hudson & F. M. Prince).

The list of contents will be found in the advertising section at the end of this number of the Chronicle.

Medical Education. Annotated Bibliography 1946-1955. Geneva 1958. 391 pages.
Price £1 15s \$6.75 or Sw fr 20.—
(clothbound)

In this volume the World Health Organization presents a bibliography on medical education covering material published between 1946 and 1955 inclusive. It is based on exhaustive research in such sources as the *Quarterly Cumulative Index Medicus*, the *Current List of Medical Literature*, the *Armed Forces Medical Library Catalog*, the indexes and catalogues of the WHO Library and where necessary the specialized indexes and abstracting periodicals. Well over 4000 references were collected virtually all of them were examined and some 2600 were finally chosen for inclusion in the bibliography. In a few cases it was not possible to obtain the original material and the reference cited has not therefore been verified.

The concept of medical education as a continuous process has been stressed for many years but certain limitations were of necessity placed on the scope of this publication. Undergraduate medical education is considered to extend to the time a student receives the degree or diploma which in his country is the requirement for independent practice or for admission to the examination which will permit him to practise. Articles dealing with internship have been included since in some countries this is considered to be part of the medical course. Throughout the bibliography special emphasis has been laid on the training of teachers.

International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 3 of the Procedure for the Selection of Recommended International Non Proprietary Names for Pharmaceutical Preparations notice is hereby given that the following names are under consideration by the World Health Organization as proposed international non proprietary names

Comments on or formal objections to

the proposed names may be forwarded by any person to the Pharmaceutical Section of the World Health Organization within four months from 1 March 1959

The inclusion of a name in the lists of proposed international non proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

PROPOSED INTERNATIONAL NON PROPRIETARY NAMES (Prop IN N) LIST 7^a

Proposed International Non-Proprietary Name (Latin, English)	Chemical Name or Description
dextropropoxyphenum dextropropoxyphene	(+)-4-dimethylamino-3-methyl-1,2-diphenyl-2-propionoxybutane
dimeoxadolum dimeoxadol	dimethylaminoethyl 1-ethoxy 1,1-diphenylacetate
levopropoxyphenum levopropoxyphene	(-)-4-dimethylamino-3-methyl-1,2-diphenyl-2-propionoxybutane
nicomorphinum nicomorphine	dinicotinic acid ester of morphine
norcodinum narcodine	N-demethylated codeine
normorphinum normorphine	N-dimethylated morphine
noscipinum noscip	(-)-1-methyl-8-methoxy-6,7-methylenedioxy-1-(6,7-dimethoxy-3-phthalidyl)-1,2,3,4-tetrahydroisoquinoline (name used previously: narcotine)

^a See *Off. R. W.H. Hk. Org.* 1955 60 3 35

Other lists of proposed international non-proprietary names can be found in *Chron. W.H. Hk. Org.* 1953 7 97 1954 8 16, 313 19 6, 10 1957 11 231 19 8 12, 102.

In accordance with paragraph 7 of the Procedure for the Selection of Recommended International Non Proprietary Names for Pharmaceutical Preparations³ notice is hereby given that the following are selected as recommended international non proprietary names

The inclusion of a name in the lists of recommended international non proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

RECOMMENDED INTERNATIONAL NON PROPRIETARY NAMES (*Rec INN*) LIST 2⁴

<i>R m m d d I il</i> <i>No P p t y N m</i> (<i>Lat n E gl sh</i>)	<i>Ch m c l Nam D pfl</i>
acetylmethadolum acetylmethadol	6-dimethylamino-4,4-diphenyl-3-acetoxyheptane
alphacetylmethadolum alphacetylmethadol	-6-dimethylamino-4,4-diphenyl-3-acetoxyheptane
alphamethadolum alphamethadol	α -6-dimethylamino-4,4-diphenyl-3-heptanol
anileridinum anileridine	1-[2-(p-aminophenyl)-ethyl]-4-phenylpiperidine-4-carboxylic acid ethyl ester
betacetylmethadolum betacetylmethadol	β -6-dimethylamino-4,4-diphenyl-3-acetoxyheptane
betamethadolum betamethadol	β -6-dimethylamino-4,4-diphenyl-3-heptanol
betaprodinum betaprodine	β -1,3-dimethyl-4-phenyl-4-propionoxypiperidine
desomorphinum desomorphine	dihydrodesoxymorphine
diethylthiambutenum diethylthiambutene	3-diethylamino-1,1-di-(2-thienyl)-1-butene
dimethylthiambutenum dimethylthiambutene	3-dimethylamino-1,1-di-(2-thienyl)-1-butene
dipipanonium dipipanone	4,4-diphenyl-6-piperidino-3-heptanone
ethoheptazinum ethoheptazine	1-methyl-4-carbethoxy-4-phenylhexamethyleneimine
ethylmethylthiambutenum ethylmethylthiambutene	3-ethylmethylamino-1,1-di-(2-thienyl)-1-butene
hydroxypethidinum hydroxypethidine	1-methyl-4-(3-hydroxyphenyl)-piperidine-4-carboxylic acid ethyl ester
levallorphanum levallorphan	(-)-3-hydroxy-N-allylmorphinan
levorphanolum levorphanol	(-)-3-hydroxy-N-methylmorphinan

See *Off R Wild Hlth O g* 1955 60 3 55
A first list of recommended tentative proprietary names

be f d n Ch *Wild Hlth O g* 1955 9 185

metethioheptazinum	1,3-dimethyl-4-carbomethoxy-4-phenylhexamethyleneamine
metethioheptazine	1,3-dimethyl-4-carbomethoxy-4-phenylhexamethyleneamine
metheptazinum	1,3-dimethyl-4-carbomethoxy-4-phenylhexamethyleneamine
metheptazine	1,3-dimethyl-4-carbomethoxy-4-phenylhexamethyleneamine
methylidesorphinum	6-methyl Δ^1 -desomorphine
methylidesorphine	6-methyl Δ^1 -desomorphine
methylidihydromorphinum	6-methylidihydromorphine
methylidihydromorphine	6-methylidihydromorphine
myrophinum	myristyl ester of benzylmorphine
myrophine	myristyl ester of benzylmorphine
normethadonum	4,4-diphenyl-6-dimethylamino-3-hexanone
methadone	4,4-diphenyl-6-dimethylamino-3-hexanone
oxpheneridinum	1-(2-phenyl-2-hydroxyethyl)-4-carbomethoxy-4-phenylpiperidine
oxpheneridine	1-(2-phenyl-2-hydroxyethyl)-4-carbomethoxy-4-phenylpiperidine
oxymorphonum	dihydroxy morphine
oxymorphone	dihydroxy morphine
phenomorphinum	3-hydroxy Δ^1 -phenethylmorphinan
phenomorphane	3-hydroxy Δ^1 -phenethylmorphinan
proheptazinum	1,3-dimethyl-4-phenyl-4-propoxyhexamethyleneamine
proheptazine	1,3-dimethyl-4-phenyl-4-propoxyhexamethyleneamine
propendinum	1-methyl-4-phenylpiperidine-4-carboxylic acid isopropyl ester
propendine	1-methyl-4-phenylpiperidine-4-carboxylic acid isopropyl ester
propoxyphenum	4-dimethylamino-1,2-diphenyl-3-methyl-2-propoxybenzene
propoxyphene	4-dimethylamino-1,2-diphenyl-3-methyl-2-propoxybenzene

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BULLETIN

DE OF
L'ORGANISATION MONDIALE THE WORLD HEALTH
DE LA SANTÉ ORGANIZATION

Extent and epidemiology of endemic goitre in Bosnia and Herzegovina
—*Grupica Žarković & Miroslav Radošević*

Present status of *Phlebotomus* in certain areas of Greece—*John Hodjunicoloo*

Studies on the microscopic slide agglutination test for Q fever—*Brenno Bobudieri*

Inter laboratory evaluation of serological tests for syphilis in India
final report on 1953-55 inquiry—*R V Rojom*

Insecticide resistance in bed bugs—*James R Busvine*

Laboratory studies on the behaviouristic resistance of *Anopheles albimanus* in Panama—*A W A Brown*

Observations on the physiology of adult anophelines in Asia—*W Buttiker*

A method of predicting the effect of nozzle erosion from water wettable insecticides on the discharge rates of nozzles—*Richard P Lonergan & Lawrence B Hall*

Notes

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THE HEALTH OF SEAFARERS

Since ancient times the seafarer has been held responsible for carrying infection from one port to another. With the discovery of America and the expansion of navigation in the fifteenth and sixteenth centuries new diseases made an appearance such as scurvy which for centuries remained a scourge of seafarers and syphilis. Scurvy has long since lost its terrors but syphilis among seafarers is still an important health problem and one on which much international action has been taken. It is being increasingly recognized however that venereal disease should be viewed against the wider background of the health of seafarers as a whole.

Between ancient times and the fifteenth century there was little change in the design of ships both the warship and the merchant man were small vessels unfitted by their construction for ocean navigation. Ships on the whole did not spend long periods at sea and their crews depended less on food carried on board than on frequent calls at port. The seafarer was indeed a carrier of disease which he picked up in one port and conveyed to the people on shore at the next and because of his calling he was more exposed to infection than most land-dwellers. It gradually became recognized that this tendency of seafarers to spread infection called for preventive measures and by the fourteenth century a system of quarantine had been introduced in Italy¹ the first proper quarantine stations being set up by Venice at the beginning of the fifteenth century.

In the fourteenth and fifteenth centuries great strides were made in ship-building. Carracks and caravels were built vessels greatly in advance of anything that had gone before and the first which were capable of ocean navigation. The compass had been invented in the twelfth century the cross staff and the astrolabe shortly after. The situation was therefore ripe for an expansion

of exploration. The discovery of America merely gave impetus to a movement which already had much momentum of its own increasing the number of small ships setting out on voyages lasting weeks or months over totally uncharted expanses of ocean peopled with unimaginable devils and monsters.

Unimaginable maladies lay in wait for the unwary seafarer too. "The said unknown sickness began to spread itself amongst us after the strangest sort that ever was eyther heard of or scene insomuch as some did lose all their strength and could not stand on their feete then did their legges swell their sinnowes shrink as black as any cole. Others also had all their skins spotted with spots of blood of a purple colour then did it ascend up to their ankles knees thighs shoulders armes and necke their mouth became stunking their gummies so rotten that all the flesh did fall off even to the rootes of the teeth which did also almost all fall out. With such infection did this sickness spread itself in our three ships that about the middle of February of a hundred and tenn persons that we were there were not ten whole so that one could not help the other a most horrible and pitifull case. There were already eight dead and more than fifty sick and as we thought past all hope of recovery."²

The crews of these small vessels died like flies. No one paid sufficient attention to the problem of equipping a ship with enough food and water to last out till it could be victualled so they often died from hunger and thirst. No one knew anything about the principles of dietetics food taken aboard for consumption during the voyage being selected for its keeping qualities not to provide the crew with a balanced diet. Deficiency states were accordingly common creating such havoc as Hakluyt describes.

¹ G. H. S. & De Schman, Z. (1956) *Disease on land and in the sea*. ref. Worl. H. h. Org. mon. Gene.

² H. K. v. R. (1600) 73. *Prin. pall.* on London.

Scurvy continued to be a major health hazard of long voyages for three centuries. In 1753 James Lind a doctor in the British navy published a *Treatise of the Scurvy* in which he advocated the general use of lemon juice to ward off the disease but it was not till 1795 that this treatment was sufficiently generally accepted for an Admiralty order to make lemon juice an obligatory part of naval rations. Once the simple remedy became known scurvy and the fear it inspired soon became things of the past.

Conditions on board these tiny ships which spent months at a time at sea were primitive in the extreme. The crew's quarters were cramped; its members huddled together in virtually squalid conditions. Food was bad and usually inadequate. There was no proper sanitation, little or no special accommodation for the sick, and no medical care or nursing until the vessel docked if then. Not surprisingly the mortality rate was high. Infectious diseases spread like wildfire and if one of the crew had an accident and was badly hurt his chances of survival were slight.

The Industrial Revolution brought with it an immense expansion of sea-borne trade. Bigger ships were built and steamships began to oust the sailing vessels which from earliest times had carried men and merchandise across the seas. The new ships carried larger crews but accommodation was as cramped as it had ever been in sailing ships and disease was rife. The ships were faster and so made port more frequently with the result that one health problem—that of feeding the crew properly—was to a certain extent simplified. But little or nothing was done to make the crew comfortable in its quarters or to provide the seafarer with something to do in his spare time either aboard or ashore.

Venereal disease and seafarers

Syphilis first became prominent in Europe at the end of the fifteenth century. From Europe it rapidly became known through the world and the part played by seafarers in its spread probably was of great importance. While deficiency states and infec-

tious disease have become of relatively minor importance in the hygiene of seafaring life venereal diseases—syphilis, gonorrhoea, chancroid, lymphogranuloma venereum, donovanosis and non gonococcal urethritis—remain a major problem. Here is a group of diseases whose treatment was until recently long drawn out and unpleasant. Because of the stigma still though perhaps decreasingly attached to them the seafarer or other patient may wish to hide the fact that he is suffering from a venereal disease and may be reluctant to attend the outpatient department of a general hospital or clinic. The disease may have such trivial symptoms in its early stages that he may be tempted not to do anything about it.

In 1802 Denmark enacted a law for the provision of free treatment of venereal infections in seafarers whatever their nationality³ but this enlightened example was not widely followed and it took a century for free treatment to become available in a fair proportion of the major ports of the world. The great increase in the incidence of venereal disease after the First World War however brought the problem to the fore.

The Brussels Agreement

In 1920 the Office International d'Hygiène Publique (OIHP) and the International Labour Organisation (ILO) advocated the free treatment of venereal disease in all large ports. The OIHP prepared a draft agreement on the subject which it circulated in 1921 to its members. In the same year the Belgian Government proposed to maritime nations whether members of the OIHP or not that they adhere to the OIHP draft agreement. The agreement was eventually signed at Brussels on 1 December 1924 and bore the title of the Agreement of Brussels 1924 respecting Facilities to be given to Merchant Seamen for the Treatment of Venereal Diseases.

The Brussels Agreement as it is generally called was the first international health instrument which provided for free treatment of a disease on an international basis without

³ See I.L.O. Dig. III, h, Leg. 1956, 7, 160.

distinction of nationality. This was a considerable step forward in international co-operation in the field of health. The contracting parties undertook to establish services— with up-to-date technical equipment and a staff of modern specialists kept constantly abreast of the progress of medical science—for the treatment of venereal disease in their principal sea or river ports. The services were to be readily accessible proportionate to the volume of traffic in the port and equipped with a sufficient number of hospital beds. Treatment and medical supplies needed till the next port of call were to be free of charge. Each patient was to receive a personal card (on which so as to spare him any possible embarrassment he was to be designated by a number only) containing particulars of the diagnosis, the treatment earned out on shore, the treatment to be carried out on the voyage and the results of serological examinations undertaken. The existence of the services was to be made known to crews by shipowners, masters of ships and sanitary officers.

The Brussels Agreement led to the establishment of centres for the free treatment of venereal diseases in many ports throughout the world. But it set various problems administrative problems such as who or what agency was to cover the cost of the treatment—government shipowner health insurance or special fund technical problems such as the international evaluation of the results of serological reactions. The OIHP and the League of Nations Health Organisation took up the technical problems and convened conferences on the serodiagnosis of syphilis in 1928 and 1930.¹² In 1931 ILO reviewing the Brussels Agreement¹³ reported that while some governments had not adhered to it they were not opposed to it, and many had organized treatment for venereal disease in their own ports usually

free of charge. In 1933 the OIHP published a list of treatment facilities in ports throughout the world and also revised the personal card, the revision being accepted by signatory governments in 1934. ILO which was greatly interested in the seafarer's working conditions and had established a comprehensive series of conventions for their improvement in 1936 stressed the need for making known to seafarers the dangers of venereal and other infections, the means of preventing them and the necessity of treatment and also the need for the repression of soliciting in ports.⁷ In 1936 the International Union against the Venereal Diseases (IUVD)—a non governmental organization—took up the question of venereal diseases in inland ports. A system of treatment based on the Brussels Agreement was organized on the Rhine and on the Danube and the OIHP included the major ports of these rivers in its world list of treatment facilities.

After the Second World War

The Second World War like the First was accompanied by an increase in venereal disease. But the situation at its close was fundamentally different from that at the end of the First because of the advent of penicillin though this was not at once universally recognized among venereologists to be a simple and effective form of therapy. The functions of the OHP had been assumed by the Interim Commission of WHO in 1946 and the Organization therefore became concerned with the administration and revision of the Brussels Agreement. The WHO Expert Committee on Venereal Diseases which scrutinized the Brussels Agreement in 1948 and 1949 held the view that more countries should adhere to it pending the possible establishment in the light of experience of international health regulations for the control of venereal disease. Several nations concurring with this view notified their adherence to the Brussels Agreement and 67 countries and territories are now parties to it.

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The same Expert Committee supported a proposal made by the International Union against the Venereal Diseases and the Treponematoses (IUVDT) as it was now called for a port demonstration project in Europe to study the effect of improved methods of treatment on the problem of venereal disease in seafarers and to disseminate the information acquired which would be useful in assessing the value of the Brussels Agreement. Rotterdam was selected as a suitable port for it was one of the largest sea ports in Europe as well as the terminus for most of the Rhine shipping and it already had a maritime health centre with a trained nucleus of medical laboratory and medico social staff. WHO and the Netherlands Government the Municipality of Rotterdam and the Central Organization for Skin and Venereal Disease Control at Rotterdam came to an agreement on the use of the existing centre and the Rotterdam Port Demonstration Centre was formally opened in December 1951. It started work by organizing groups to study the Brussels Agreement the establishment of treatment centres and hospitalization in ports the treatment of venereal disease on board ships and ashore laboratory procedures evaluation and standardization epidemiological procedures the exchange of information about contacts medico social work seamen's welfare health education and legislation.

On proposals made by the riverain governments WHO also established an International Rhine River Anti Venereal Disease Commission which met in 1951 1952 and 1953 and co-ordinated the control measures taken by Belgium France Germany the Netherlands and Switzerland. These measures were very successful indeed and by the end of 1953 venereal infection among Rhine boatmen had declined to such a low level that the Commission could wind up its work on the grounds that the objective for which it had been created had been achieved and that the European Regional Office of WHO could keep a watch on the situation and take any measures that might be required in the future.

WHO has followed in the footsteps of the OIHP and revised the international list of

venereal disease centres in ports⁸ and the seafarers' personal card now called the individual treatment booklet (*carnet international*) WHO transmits information received regarding the inadequacy of port facilities to the government concerned. It provides certain services for the improvement of facilities in ports for example it has helped to establish a social hygiene clinic and laboratory to serve the ports of Chittagong and Karachi in Pakistan. And it publishes studies sometimes in collaboration with the IUVDT on the nature extent and control of venereal infections in ports^{9 10 11}.

At the time when the Brussels Agreement was signed venereal disease was probably the most important health problem of seafarers and the most important to shipowners from the point of view of loss of working time. Both the early and late but particularly the late stages of syphilis and gonorrhoea as well as their treatment usually meant time off work and sometimes resulted in permanent invalidism. Repeated doses of toxic arsenicals had to be given for syphilis and long absences from work and several courses of treatment were required so that it was exceedingly important for doctors to know what treatment had been given. The incidence of syphilis was high in 1919 just after the First World War in Denmark and Norway two typical maritime nations the over all rates were 52.7 and 36.0 per 10 000 respectively with a higher incidence in the larger ports^{12 13}. The incidence of gonorrhoea was higher still. Conditions later became more stable and great efforts were made to control

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syphilis with the result that the rates in Denmark and Norway fell gradually to 2.2 and 1.5 per 10 000 respectively for the period 1932-1935.

Although the gross tonnage of world shipping had by 1947 reached and passed the pre-war (1939) level of 69 440 000 tons going on to exceed 100 000 000 by 1955 the incidence of syphilis was 1.1 per 10 000 for 1950-1952 in Denmark and 0.8 per 100 000 in Norway for 1952-1955. This low incidence was obviously at least in part due to the introduction of penicillin. Statistics from ports while they appeared to show a decline in early syphilis did not lend themselves to definite conclusions regarding gonorrhoea which appeared in some ports to be if anything on the increase.

In general statistics should not be regarded as giving a wholly reliable picture of venereal disease in seafarers for a variety of reasons. It is more than likely that the simplification of treatment has led to an increase in treatment outside hospitals and dispensaries by private doctors. The apparent decline in the incidence has had as a sequel an increased apathy towards measures designed to reduce the incidence further and towards careful notification of cases, an apathy well known in all fields concerned with the control of communicable disease. This apathy is often shared by the seafarers themselves, convinced that penicillin will cure them, they may postpone treatment indefinitely. Again it has become a practice in recent years for persons not medically qualified to give penicillin on board ships. Some shipping companies prefer to make a private arrangement with port doctors to see members of crews of their ships and some maritime nations have developed health insurance schemes covering illnesses abroad so that seafarers can go to doctors privately. None of these consultations may be reported. The decline in venereal disease among seafarers may therefore be only apparent and is indeed questioned by some authorities. That there are likely to be more sufferers from venereal disease than is currently reported is shown by an interesting experiment conducted by a Dutch shipping company which placed on board

its freighters male nurses who also acted as ships clerks. The percentage of cases reporting for treatment of venereal disease among the European seamen of 11 ships over a period of a year rose from 7.5 to as much as 17.

The extent to which the Brussels Agreement was being observed was the subject of an enquiry carried out jointly in 1952 by the Rotterdam Port Demonstration Centre and WHO. Questionnaires were sent to over 600 ports throughout the world but only 185 replies were received. These replies were nevertheless of great interest. Many countries applied the Agreement in only a limited number of ports. Many provided no free hospital beds and only 30% of the ports provided hospital treatment at all. In quite a number treatment booklets were unknown. The international list of venereal disease treatment centres was to be found in only about a quarter. Pamphlets were distributed on board in 46 ports and in a number of others pamphlets were available but were rarely distributed. Posters were used in only 60 ports. Differences in language were naturally enough a considerable problem in most ports. It may be inferred that facilities were no better if as good in the ports that did not reply to the questionnaire.

The Rotterdam centre also made enquiries into facilities for treatment and found that they were often unsatisfactory. Sometimes the clinics were a long way from the docks and difficult to get to or the hours of opening were short or inconvenient or the seafarer had to wait a long time. A few clinics were open for only an hour a day. In some countries there was reluctance to attend clinics in ports because of racial prejudice or lack of confidence in the treatment. The question of hospitalization tended to raise difficulties everywhere. Seafarers were unwilling to go to hospital because it was in a foreign country or it cost money or going to hospital meant that on their discharge their ship would be gone and they would find themselves unemployed and without money. Where there was a shortage

of hospital beds the health authorities naturally preferred to give first choice to their own nationals

A variety of laboratory methods (23 in all) were in use for the diagnosis of syphilis and diagnosis by darkfield microscopy was not possible in 20% of port clinics. In 65% more than 48 hours were required to obtain the results of serological tests clearly too long a time if a seafarer was making only a short call in port.

In many ports the value of penicillin as a treatment for syphilis was insufficiently recognized or little was known about long acting preparations or suitable dosages. From that point of view the treatment given in ports was in sharp contrast to that given elsewhere as was shown by a WHO survey undertaken in 1953. This survey reviewed the treatment provided by a representative selection of leading venereologists in 294 central (university and other) venereal disease clinics throughout the world.¹⁶ More than 70% of these venereologists used penicillin alone in the treatment of early syphilis in the form of long acting preparations in particular procaine penicillin G in oil with 2% aluminium monostearate (PAM) and many had adopted the practice of giving a massive initial insurance dose. Only 16% of port clinics on the other hand used penicillin exclusively for the treatment of early syphilis and few used PAM preparations the rapid intensive course with a massive initial dose was most uncommon. In 5% of port clinics arsenicals and bismuth were used exclusively and in many they were combined with penicillin the treatment being prolonged.

A survey undertaken by WHO two years later¹⁷ showed a welcome increase in the use of penicillin by port clinics. Replies to a questionnaire were received from treatment centres in 171 ports (or large cities likely to deal with seafarers) in 25 maritime countries. Out of 167 systems of treatment penicillin alone was used in 83.2% and penicillin plus metal in 16.8%.

Re examination of the Brussels Agreement

The health of the seafarer and particularly the problem of venereal disease as it affects him must be viewed against the background of his psychology and way of life and in the wider context of his welfare as an individual. This was recognized by a WHO Study Group on the Brussels Agreement.

This Study Group which met at Oslo in December 1956¹⁸ concurred with the view that the Agreement had had a beneficial effect on the international control of venereal disease among seafarers and had proved that medical assistance could be made available internationally without distinction of rank nationality race or religion. It was still more or less true however as had been observed by the IUVD in 1934¹⁹ that although there were many organizations working for seafarers little was being done to assess to what extent seafarers were benefiting from this work so that the Brussels Agreement was failing to a considerable extent through lack of attention to details of primary importance. No clear information was available on the extent of the services provided by governments and statistics of national and foreign seafarers making use of them were rarely supplied.

The Interim Commission of the World Health Organization had favoured some revision of the Brussels Agreement possibly in the form of international health regulations for the control of venereal disease.⁶ It had suggested this just after the end of the Second World War when the incidence of venereal disease was still high because of extensive movements of military and civil populations unsettled conditions unorganized health services inadequate supplies of antibiotics and lack of agreement between venereologists on norms of treatment. The Study Group believed that even with the Agreement's recognized limitations the situation was now so different that the establishment of international regulations conferred

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no special advantages. The replacement of the Agreement by some other instrument would require complex machinery and there was some doubt about the feasibility of international regulations for the control of venereal disease (or for that matter for the control of say tuberculosis).²¹

The problem of venereal disease nevertheless continued to exist among seafarers although it was of diminished importance and it was always possible that it might again become acute if inadequate attention was paid to control measures or world conditions became less stable or resistance to antibiotics developed. International agreement on the control of venereal disease in seafarers was therefore still needed particularly since important reservoirs of venereal infection still remained in the less developed areas and since maritime communications with these tended to increase *pari passu* with their economic and social development. The Study Group therefore considered that the Brussels Agreement should be retained but that it was important for it to be kept abreast of technical developments—it was not sufficient to pay lip-service only to the provision to that effect in the Agreement—and for its implications to be constantly redefined in the light of the existing situation. It should therefore be reviewed periodically by a suitable WHO consultative committee of technical experts which should also assess the degree to which its provisions were observed and make recommendations regarding minimum standards of practice which could be transmitted to signatory governments and other interested Member States of WHO.

The WHO Study Group in Oslo was insistent however on the value of a broader approach to the problem of venereal disease in the seafarer health administrations generally were concerned with a more comprehensive attitude to public health in harmony with the modern concept of the integration of the preventive curative rehabilitative and other aspects of each health problem. Few other occupational groups illustrated the need for a broader approach so well

particularly as it had been shown that there was a markedly higher frequency of accidents invalidism and general as well as special disease in seafarers as compared with the general population.²²

Before such a broader approach became feasible and internationally comprehensive health services for all seafarers could become a reality many complex questions had to be faced. These included the nature and extent of the services to be provided how best they could be provided—through maritime medical centres for instance or through arrangements with health insurance organizations and medical associations—how they could be financed whether an international maritime health conference was desirable and what type of international instrument would best serve the purpose. Indeed considerable preliminary work was needed even before these questions could be considered. Information was required for example about the incidence of disease invalidism and accidents among seafarers—which was available in only a few countries. Little definite information was available about health conditions among seafarers in ports or about the needs for out patient treatment hospitalization etc in relation to the number of seafarers their nationality and the flags and tonnage of ships represented.

One way of approaching the problem would be step by step. Thus it might be decided first to deal with individual diseases or groups of diseases such as tuberculosis or tropical diseases or even communicable diseases as a whole. An objection to this was that if any single disease or group of diseases was taken out of context, it would eventually become necessary to re-define the implications of any international agreement of a limited character as medical practice and social and economic conditions progressed. A committee set up by the Netherlands Government to examine the Brussels Agreement aware of this objection had stressed the importance of creating maritime medical centres accessible to seafarers of all nationalities, where all not merely venereal diseases could be treated.

²¹ *Id. Hl & Org. Wk. R. Ser.* 1958, 150, 33.

²² *Id. Hl & Org. Wk. R. Ser.* 1958, 150, 39.

Various countries had devised schemes to look after the general health of their seamen. But in some countries the organization of these schemes was faulty and in others non-existent. A great deal could be done by international co-operation to remedy these defects. There was a need for a broad international instrument on the health of seafarers generally to which interested nations could accede and the Brussels Agreement could gradually be absorbed into the new instrument as maritime nations adhered to it.

The broader approach to the health of the seafarer

WHO and ILO had early recognized that the health of seafarers was a subject with which both were concerned and that it was desirable that there should be no overlapping or duplication of work between the two organizations. They therefore set up a Joint ILO/WHO Committee on the Hygiene of Seafarers whose first report appeared in 1950.³

Venereal disease was an important aspect of the seafarer's health but it was far from being the only one. ILO's conventions on medical examinations, crew accommodation and food and catering and its recommendations on welfare in ports were obviously also of importance. The Committee's examination of the health of seafarers was therefore conducted on a broad front.

The Committee thought that a medical and X-ray examination should be made a condition of a seaman's employment in order to prevent men with active pulmonary tuberculosis from being recruited into the merchant service. A scheme should also be evolved for subsequent periodical examinations and both the initial and the subsequent examinations should not be confined to a search for tuberculosis only but should cover the whole of the seafarer's health. The question of a medical record for each seafarer analogous to the individual treatment booklet for venereal disease but covering the whole range of disease raised important problems

such as that of secrecy but deserved investigation.

The problem of providing the seafarer with a hospital bed when required was a complex one. It included the question of isolation on board ship for certain diseases, the need at times for the seafarer to be speedily transferred to receive skilled medical or surgical care, the provision of suitable food for seafarers in countries with a very different staple diet from their own and the ancillary problem of medicine chests on board ship (minimum requirements and periodic overhauls). Nor was this all. There was the question whether seafarers always received as good hospital treatment as other sections of the population—and if not whether this was due to national racial or other prejudice or because no one was responsible for ensuring that they went to the most suitable hospital. Complicating factors in the problem were the acute shortage of hospital accommodation in many countries and the lack of qualified medical men in some. More information was required on all these subjects.

The Joint Committee's second report appeared in 1955.⁴ While statistics were as yet insufficient for the Committee to compare the incidence of tuberculosis in seafarers with that in the rest of the population or in other industries it stressed certain important considerations which should be borne in mind in this connexion. Seafarers were often cut off for long periods from adequate specialist treatment and however good crew accommodation on modern ships had become, numbers of the crew were still herded together in comparatively confined spaces whether on or off duty. Furthermore in the course of his duty the seafarer might well have to put ashore in countries where the incidence of tuberculosis was well above average. It was desirable therefore that all new entrants to the merchant navy be examined for tuberculosis. Periodic re-examination was also desirable but views on compulsory examinations differed. The question of compulsion was not exclusively a medical one and there were psychological objections to treating seafarers

as a special class when compulsion was not general or usual for other classes of employment. Careful attention should be given to rehabilitation of seafarers who had recovered from tuberculosis so as to enable selected cases to go back to sea and others to find suitable employment.

The Joint Committee's first report had reviewed the question of the medicine chests on board ship. Its second report contained a list of medicaments, instruments, appliances and other equipment for the guidance of governments in the preparation or revision of regulations in this connexion. It also directed the attention of governments to certain improvements that might be made in the provision of medical advice by radio to ships at sea.

The Joint Committee's second report also reviewed the maritime aspects of venereal disease control.⁴² Modern treatment of syphilis had important direct and indirect consequences. Not only was the cost of treating a patient with penicillin 15-20% less than it would have been with bismuth and the arsenicals, but such treatment was ambulatory and completed within days instead of weeks or months. Practice varied, but in the merchant navies of some maritime countries patients with early syphilis were treated as outpatients with the result that absenteeism and working time lost in ports were reduced.

The Joint Committee considered that, as a contribution to the control of venereal disease, attempts should be made despite the difficulties to trace and to treat infected contacts. Up-to-date treatment should be employed universally and vigorous steps taken by governments to see that it was. The WHO Expert Committee on Venereal Infections and Treponematoses had recommended in 1953 the preparation of a report on the epidemiology, therapy and laboratory and other aspects of venereal disease control among seafarers. It would also deal—the Joint Committee hoped—with the employment of the seafarer during and after treatment, include a model scheme of diagnostic, therapeutic and other control practices in syphilis

and other venereal infections and assess the place of special examinations in routine periodical examinations.

Seafarers' health in the future

A great deal has been done since the beginning of the twentieth century for the seafarer's health and welfare. In the past he was largely ignored as a member of the community because of the impermanence of his stay in any one place and he was to some extent treated as an outcast because of the danger of infection that he brought with him and the disturbances of the peace he was apt to cause. Now it is being increasingly recognized that he belongs to a vast industry which is entitled to enjoy reasonable working conditions as much as any other industry and is indeed possibly entitled to greater consideration because of its special nature. His hours of work, his working conditions and the accommodation provided for him in ships have been on the whole much improved, largely through the efforts of ILO. Naturally his working conditions vary throughout the world; they are, for example, by no means as satisfactory in the less developed countries as in the more advanced. By and large, however, there has been an impressive improvement.

Concurrently a greater interest has been taken in his welfare and here again there has been a fuller recognition of the special nature of his calling and of the social and psychological problems that are inextricably bound up with it. Much has been done to provide the seafarer with somewhere to go when he docks, suitable company and something to do to while away his leisure, and recreation books and other amenities are being increasingly provided on board.

Welfare work for sailors is closely linked with the problem of keeping them in good health for it is with justice claimed that a seafarer who has adequate recreation on board and an attractive centre to go to when he comes off ship is less likely to succumb to bouts of alcoholism and expose himself to infection in the more sordid quarters of the ports he visits. Medical examinations

Various countries had devised schemes to look after the general health of their seamen. But in some countries the organization of these schemes was faulty and in others non-existent. A great deal could be done by international co-operation to remedy these defects. There was a need for a broad international instrument on the health of seafarers generally to which interested nations could accede and the Brussels Agreement could gradually be absorbed into the new instrument as maritime nations adhered to it.

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The Committee thought that a medical and X-ray examination should be made a condition of a seaman's employment in order to prevent men with active pulmonary tuberculosis from being recruited into the merchant service. A scheme should also be evolved for subsequent periodical examinations and both the initial and the subsequent examinations should not be confined to a search for tuberculosis only but should cover the whole of the seafarer's health. The question of a medical record for each seafarer analogous to the individual treatment booklet for venereal disease but covering the whole range of disease raised important problems

such as that of secrecy but deserved investigation.

The problem of providing the seafarer with a hospital bed when required was a complex one. It included the question of isolation on board ship for certain diseases, the need at times for the seafarer to be speedily transferred to receive skilled medical or surgical care, the provision of suitable food for seafarers in countries with a very different staple diet from their own and the ancillary problem of medicine chests on board ship (minimum requirements and periodic overhauls). Nor was this all. There was the question whether seafarers always received as good hospital treatment as other sections of the population—and if not whether this was due to national racial or other prejudice or because no one was responsible for ensuring that they went to the most suitable hospital. Complicating factors in the problem were the acute shortage of hospital accommodation in many countries and the lack of qualified medical men in some. More information was required on all these subjects.

The Joint Committee's second report appeared in 1955.⁴ While statistics were as yet insufficient for the Committee to compare the incidence of tuberculosis in seafarers with that in the rest of the population or in other industries it stressed certain important considerations which should be borne in mind in this connexion. Seafarers were often cut off for long periods from adequate specialist treatment and however good crew accommodation on modern ships had become numbers of the crew were still herded together in comparatively confined spaces whether on or off duty. Furthermore in the course of his duty the seafarer might well have to put ashore in countries where the incidence of tuberculosis was well above average. It was desirable therefore that all new entrants to the merchant navy be examined for tuberculosis. Periodic re-examination was also desirable but views on compulsory examinations differed. The question of compulsion was not exclusively a medical one and there were psychological objections to treating seafarers

Office for the Americas the Conference was attended by professors of schools of medicine and public health from six South American countries. Its report has now been published.²

Present situation

At present states the report the teaching of medical statistics in South American medical schools is not satisfactory. In the majority of schools there is no regular instruction in statistics and in others such instruction began in the past three years. Generally statistics is taught either in the basic medical science departments or in the department of preventive medicine and only in a few schools is instruction given throughout the entire medical curriculum. The level of teaching is elementary and both staff and equipment fall short of what they should be. In almost all schools there is no professor exclusively responsible for the teaching.

A direct relationship was observed by the Conference between the degree to which the teaching of medical statistics had developed and each of the following: the use of effective teaching methods; the amount of collaboration by clinical departments in the teaching; and the organization and regularity of the teaching. In proportion as teaching developed interest on the part of the various departments was found to increase.

Statistical activities in schools of medicine

It is desirable—and the report stresses the point—that in every medical school there should be a nucleus of people capable of providing adequate statistical instruction and encouraging statistical activities. In addition to imparting instruction to medical students, physicians, teachers, those engaged in medical research and members of the paramedical professions, this nucleus should, for example, provide statistical assistance to the various departments of the school of medicine, carry out research in statistical methods applicable in medicine and collaborate with other institutions in the study of problems of mutual interest.

For an adequate discussion of the medical curriculum the normal functions of the physician require analysis. In general he is required to make decisions on the basis of observations which are influenced by multiple factors and subject to error. To keep himself informed on progress in his profession by the study of selected papers from an extensive literature about which he must form his own judgement and to carry out investigations into relationships between factors which interest him particularly causative and determining factors. To enable him to fulfil these functions he should have received instruction designed to provide him with certain knowledge, attitudes and skills. Such instruction should cover *inter alia* scientific method and its relationship to statistical techniques; the concept of biological variability and its association with a multiplicity of factors which influence profoundly the analysis and interpretation of biological data; the existence and measurement of error in all quantitative observations; and the complete, accurate and timely recording of health and medical data.

The Conference laid down the principle that the teaching of statistics should begin in the first two years of instruction and continue throughout the medical course, advantage being taken of every opportunity to demonstrate its application in each branch of medicine taught to the student. The application of statistics to public health should be taught in the final years.

The content of the statistical course will vary according to local conditions. As a minimum it should include the collection, processing, presentation and elementary description of the data, as well as the presentation of problems of inference by means of objective examples.

A typical course might deal with the following subjects:

- (1) steps in scientific and statistical method
- (2) techniques for the collection (experimental design, sampling, sources of error etc.) processing (types and classification of data i.e. qualitative and quantitative)

are becoming more common to ensure that the man taking up a seafaring life is in a fit state of health to do so and that when he does so he continues to be in good health. The gravity of illness or accidents at sea has been reduced by the availability of medical advice by radio at almost any hour of the day or night and by the possibility either of bringing a doctor to the patient by air or flying the patient from his ship to the nearest hospital on land.

With these advantages with the improvement in his conditions of work and the better opportunities for recreation that are offered to him both on board and ashore the future of the seafarer's health may be regarded with a certain optimism. There is still however much to be done. There is a wide gulf between the conditions of work and the health of seafarers in the more advanced and the less advanced countries. A certain amount of venereal disease is likely to occur among seafarers however

well it is treated. This may well become more important if circumstances chance—if for example war again renders social conditions unstable. Resistance to antibiotics may develop, indeed some countries report a rise in the incidence of gonorrhoea² due in part to the appearance of penicillin resistant strains of gonococci in part to misplaced faith in one shot treatment so that patients do not attend for observation after treatment or to be tested for cure. Certain fields such as that of the seafarer's mental health are still relatively unexplored. While the future may be regarded with some optimism therefore the optimism must be tempered with the realization that unremitting efforts are still required.²⁷

* See for example Ministry of Health for England and Wales (1958) Report of the Medical Officer of Health for the year 1957. Part II. On the state of the public health in HM St. Mary's Office London.

See this article with a reference to the investigation taken on the health and welfare of seafarers has been held in these days by the WHO Regional Office for Europe (see page 147).

TEACHING OF HEALTH STATISTICS

In all countries medical education has as its object the creation of conditions under which a student may acquire the knowledge, abilities, attitudes and ethics that will enable him as a physician to promote, preserve and restore health.

In addition to diagnosing and treating illnesses in the best way possible the physician must concern himself with maintaining individuals in a state of health. He must understand the human being in his physical, familial and social environment. He should furthermore be concerned with helping the progress of his own profession and with contributing toward enrichment of the medical sciences. To accomplish this and since the education of the physician lasts throughout his lifetime, existence of a true scientific spirit is an absolute essential.¹

Seen against this ideal the teaching of health statistics in medical schools is of special value because it contributes to the development of the scientific attitude. Moreover it informs the future physician about the collection and analysis of data and makes him aware of his responsibility as the primary source of certain important information.

There is increasing recognition of the value of statistics to the medical profession and of the great need for improvement in the teaching of statistical methods and their application to medical research. The South American Conference on the Teaching of Medical Statistics which met at São Paulo, Brazil from 22 to 28 July 1958, therefore came at an opportune moment. Held under the joint auspices of the Faculty of Hygiene and Public Health of the University of São Paulo and the Pan American Sanitary Bureau which serves as the WHO Regional

Translated from Spanish by the Office of the Secretary of Health, 1956. 41. 61. 62.

interested persons give them an opportunity for a basic apprenticeship in appropriate centres and make facilities available for the introduction of teaching in statistics

If these methods are successful the formation of a statistical nucleus on a full time basis should be encouraged by the provision of material resources and other suitable measures. It is necessary to ensure that the staff of the nucleus reaches and maintains a suitable technical level

Within each country an exchange of professors and meetings of teachers of statistics would be of value

International organizations could contribute to this plan through a scholarship programme which would send selected medical school staff for training to centres in South America through the provision of consultants experienced in the teaching of medical statistics who could contribute to and stimulate interest in statistical activities and the training of teaching personnel and through the translation and distribution of suitable texts. Training centres in medical statistics in South America which are at various levels and operate in many fields should be utilized nationally and internationally to remedy the scarcity of teaching staff which is the most pressing problem

Responsibility of the physician for providing statistical data

The physician is responsible not only for providing data but also for fostering an adequate system of recording information and for maintaining and improving existing statistical services. Without health statistics programmes for the improvement of the health of communities could not be planned

effectively nor could their results be properly evaluated. The physician should therefore make a special effort to fill in birth certificates carefully and accurately for if they are complete studies can be carried out on the circumstances of birth (deliveries with and without complications) and on the characteristics of the newborn (sex, weight, diseases, anomalies, etc.) and of the mothers (age, number of pregnancies, parity, foetal deaths, live births, etc.). The physician's role in producing accurate and complete records is equally important in the certification of deaths in the reporting of cases of notifiable diseases and in the clinical reports on patients under his care. Many of the defects in health statistics are essentially due to deficient instruction on the part that the physician should play in their production as well as to misconceptions concerning their importance and uses. The teaching of statistics in the department of preventive medicine should therefore be carried out in close co-operation with the clinical departments, advantage being taken of clinical meetings and of discussions of cases in infirmaries, etc. For example, the description of medical certificates of births and of foetal deaths could be carried out most effectively in the departments of obstetrics and of paediatrics and instruction on the reporting of notifiable diseases in the infectious diseases department. The distribution and use of available material on health statistics should be promoted in the departments of preventive as well as of clinical medicine. Physicians should be encouraged to make suggestions for the revision and improvement of existing statistical systems which are admittedly imperfect and for the simplification and promotion of the wider use of health statistics

Vaccination certificate requirements

Under the International Sanitary Regulations, a health authority may require travellers to produce certificates of vaccination against cholera, smallpox and yellow fever. A recent supplement to the WHO Bulletin *Epidemiological Record* (No. 6, 1959) lists vaccination certificate requirements as on 6 February 1959 for some 180 States and territories.

tabular and graphic presentation summarizing and description of the data (proportions averages measures of variability some concepts of regression and correlation)

(3) statistical inference (concept importance and basis) sampling errors estimation of parameters and tests of significance of proportions and of both independent and dependent means

This course could be completed in 12-15 sessions of three hours each devoted principally to practical exercises in which the student would take an active part. The subjects of the course should be treated in an elementary manner and should suffice for the types of problem the medical student encounters during his studies and will encounter later in his professional activities.

The study of health statistics in the final years of the medical curriculum should lay stress on the methods of obtaining data, the fundamental role of the physician and the importance of reports based upon the data. A suitable course might cover definitions, collection and analysis of data regarding population, environment, mortality, natality, morbidity, resources and services, statistical organizations which furnish the data, the participation of physicians in these organizations, appropriate statistical techniques such as rates and indices, the application of the life table to chronic diseases, etc. This course could be given in 6-8 sessions of three hours each and should also be devoted mainly to practical exercises.

There are numerous opportunities for the teaching of medical statistics throughout the medical course in collaboration with the various departments. For example, genetics offers the possibility of discussions involving the binomial and *chi*-square; bacteriology and pharmacology the planning and interpretation of experiments in relation to biological assay; and clinical medicine the statistical problem of the evaluation of diagnostic and therapeutic methods.

It is of vital importance to awaken the interest of the student from the very beginning. This may be done by a careful selection of practical examples and applications of

statistical method which should be directly associated with his medical studies. It is important also to show the direct value of the statistical method to the physician, the errors that may be avoided by its application and the dangers of its misapplication. Pure statistics should not be taught except in the training of professional statisticians and the use of complicated symbols and mathematics should be avoided. To inculcate desirable attitudes, fix knowledge and develop skills, the best methods of teaching are the active ones; hence the importance of practical work. Group work stimulates the student's activity and should be widely encouraged. In a faculty of medicine only a minimum of material is required in the teaching of statistics. Nevertheless, specialized texts should be made available in the local language for those interested.

For all these statistical activities a school of medicine requires at least one teacher who is exclusively responsible for statistics. There should be sufficient auxiliary staff to satisfy the teaching and other needs of the statistical nucleus. This nucleus may be autonomous in character or it may be incorporated in some department of the school of medicine in accordance with whatever local arrangements exist. It should have enough space, equipment and administrative staff to perform its functions adequately and it should begin with a staff versed both in statistical methodology and in the medical and biological sciences. As it grows larger, it could in view of the diversity of functions it has to perform, add specialized staff, but it should not lose sight of its special nature as a group of persons engaged in the application of statistics to the medical and biological sciences.

Recommendations for improvement

Where there are no statistical activities in a medical school, it is at first necessary to awaken the faculty's interest in the subject. For this purpose, visits, courses and lectures by professors and consultants from national or foreign centres could be encouraged. At the same time, efforts should be made to find

Several of the cases of dieldrin poisoning examined by the WHO consultant had one or more fits 15 to 120 days after the last exposure. Apart from convulsions mental disorder has been found ranging from loss of memory insomnia and nightmares to mania.

Very little is known of the pathology of dieldrin poisoning or of the dynamics of dieldrin storage in the body. It is possible that it produces a persisting morphological or biochemical lesion or both which may give rise to recurrent illness. It is also possible that some of the effects are due to an allergic reaction. Nothing is known either about the influence of such factors as under nutrition infestation with worms in breeding or an "epileptic tendency" which have been put forward as possible causes of the clinical symptoms. These factors deserve consideration but hitherto there is no evidence that they have any significance in determining the occurrence of poisoning.

There is clear evidence of a direct relationship between the dosage of dieldrin received and the occurrence of poisoning. The greater the concentration of dieldrin suspension used in spraying for example the greater is the chance of poisoning after a period of exposure. Moreover the greater the area of bare skin exposed the more likely is poisoning to occur. Again the longer spraymen work under conditions which can lead to poisoning the greater is the total incidence of poisoning. Immediate washing of the contaminated skin protects in part delayed washing offers distinctly less protection.

One of the general principles of toxicology is that even the most poisonous compound may be used if adequate safeguards are provided. For that reason each worker hired for spraying operations should be told that he is working with a dangerous compound which has produced serious illness. The symptoms of dieldrin poisoning should

be described in detail and the protective measures required outlined. There should be rigid supervision to ensure that hands face and all exposed skin are washed at frequent intervals even though no contamination is visible and that the entire body is washed with soap and water at the earliest practical moment after work has finished for the day. Free soap should be made available for this purpose. Working clothes should be washed daily with soap and water. The spraymen should wear shoes and socks and a uniform that protects them as completely as possible and includes a veil of plastic netting². These precautions have already been stressed by a WHO Study Group on the Toxic Hazards of Pesticides to Man³ and should be carefully observed.

In addition sprayers must be kept in repair to prevent leakage measuring cups funnels and other devices should have handles so that workers can use them without touching dieldrin powder or suspension and sprayers should be used at the lowest pressure consistent with effective control. There should be safety officers and spraymen and mixers should not be permitted to work more than 8 hours a day or 40 a week. When a person has had dieldrin poisoning he should be taken off work with that particular insecticide and he should be followed up medically for at least two years and preferably longer.

A further study of dieldrin is needed and cases of poisoning should be studied fully. It has been claimed that instant poisoning is detectable before serious manifestations occur by means of clinical histories and neurological examinations at intervals⁴. This claim and the question whether there is a method for measuring dieldrin in the blood or excreta deserve further investigation.

See illustrations on page 177

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W H O G J & F Lee, J F (1957) *Bol O H* 444
page 43 312

TOXICITY OF DIELDRIN TO MAN

Dieldrin is widely used as a residual insecticide in malaria eradication campaigns. In Indonesia for example it has replaced DDT because of the resistance to DDT developed by the chief local malaria vector *Anopheles sundicus*. Instructions are issued to spray squads to use it with certain precautions because of its toxicity but the spraymen are not always as careful as they might be about exposure to the insecticide. A sprayman taking part in a campaign sponsored by WHO in South East Asia is a typical example. He is a 21 year old Indonesian who began working with dieldrin in April 1956 having had no previous contact with insecticides. While applying the compound he wore shorts and a T shirt but no shoes and no hat. No soap was supplied to the unit in which he worked. Dieldrin he knew reached all parts of his body during spraying but he claims that before his evening meal each day he took a bath at home washing with soap. He had nine attacks of convulsions each followed by a period of unconsciousness lasting about a minute between August 1957 and January 1958. He continued to work with dieldrin during this entire period and it was not until March 1958 that he was finally transferred to DDT spraying. He was treated for some of his attacks in a polyclinic where he was diagnosed as having malaria. Neither he nor his family had any previous history of fits. He was normal on neurological examination.

This is not an isolated case. Others have been seen and examined by a WHO consultant Dr Wayland J Hayes Jr who has visited various countries to investigate toxic hazards in dieldrin spraying programmes and has reported cases from Venezuela, Ecuador, Nigeria and India.

Dieldrin is freely absorbed by the skin, dry dieldrin being absorbed about as easily as dieldrin in solution. It is less than twice as poisonous by mouth as it is when absorbed by the skin, in this respect differing considerably from DDT. The oral toxicity of

dieldrin is three to five times greater than that of DDT but DDT in solution is not readily absorbed by the skin and dry DDT is absorbed to such a small extent that its toxicity is not apparent.

The toxicity of dieldrin when absorbed through the skin has not in the WHO consultant's view been fully appreciated. All the unclothed skin of a sprayman (and, to a lesser extent, his clothed skin also) is subject to constant contamination during spraying operations. This "imperceptible" contamination is in addition to obvious contamination from spilt dieldrin or from direct contact with the powder or suspension. Chemical measurements of imperceptible contamination reveal its extent and show the relative unimportance of respiratory exposure.¹ These measurements are of special importance because it has commonly and incorrectly been assumed that the major source of dieldrin poisoning is respiratory exposure. Dieldrin is indeed poisonous if it is inhaled but nearly all the dieldrin in water dispersible powder is in particles that are too large for inhalation.

On the assumption that man is as susceptible to poisoning by dieldrin as experimental animals are, the mist of dieldrin which falls on the unprotected face and lower arms of spraymen is sufficient to account for the degree of poisoning which has been observed. This is not surprising during the working day this mist although imperceptible as it falls often accumulates on the exposed skin sufficiently to form a visible residue.

A given dose of dieldrin is absorbed more readily by a large than by a small area of skin. Consequently an increase in the area of skin exposed not only increases the dosage received but also facilitates absorption.

Many of the cases which have been recognized as poisoning by dieldrin have been serious and little is definitely known of the early manifestations of such poisoning.

¹ Wolf, H. R. et al. (1959) *B. H. H. J. H. O. R.* 20, 1.

FIG 2 TROPICAL HELMET WITH PLASTIC NETTING VEIL AND RUBBERIZED GLOVES FRONT VIEW



Veil attached by elastic band
to back and top of helmet

roughened absorbent or have already been sprayed the exposure is less. It is increased with temperature or when a water-dispersible powder is used rather than an emulsion.

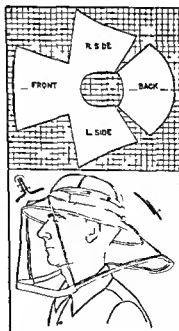
The actual exposure of spraymen in working conditions in the field has been calculated in the Taveta Pare area of East Africa by three members of the East African Institute of Malaria and Vector borne Diseases at Amani, Tanganyika (Bull. Wild Health Org. 1959 20:15). Dieldrin is used here not DDT. The men it was found are exposed to 18 mg of dieldrin per kg of body weight daily for 180 days a year with an interval of two months between spraying cycles. There have been no cases of poisoning.

Why is there no dieldrin poisoning in East Africa but poisoning in Ecuador (9% of the workers) Venezuela (18% of the

workers) and Nigeria (10% of the workers)? The East African spraymen work on an average only six hours a day and for only 180 days a year. Their overalls are washed daily and 225 g of soap is issued to each man every week. In Venezuela some men worked as much as 15 hours daily for seven days a week with no break between spraying cycles. In Nigeria hours and spraying cycles were much the same as in East Africa but clothing was not washed as frequently and only 60 g of soap was issued every two weeks. Elsewhere overalls are not worn at all and the amount of skin exposed is much greater. There is considerable variation in the degree of observation of precautions.

Various trials were made in East Africa before the protective clothing at present

FIG 3 PATTERN AND DRAWING OF PLASTIC NETTING VEIL SHOWING TAPE ATTACHMENT TO TROPICAL HELMET



The diagram details of the front and back
panels and the basic pattern of the veil

DANGERS OF INSECTICIDE SPRAYING

The hazards of spraying with dieldrin are described in the preceding article. But exactly how much is a sprayman exposed to insecticide when he works? An experiment to determine this has been carried out with DDT in the Communicable Disease Center Wenatchee Wash. USA¹. Absorbent pads were attached to various parts of a sprayman's body and he was fitted with a respirator containing a filter pad before he carried out spraying operations comparable to those he would perform in the field.

The main area of exposure from indoor surface spraying is the upper trunk and upper extremities and in this experiment these received about 1755 mg of DDT per

hour of spraying. The average respiratory exposure was about 7.1 mg of DDT per hour of spraying which is approximately equal to an inhalation of 3.4 mg of DDT per hour. The total potential exposure daily is 105 mg/kg for a worker who actually sprays for four hours of his eight hour working day. It has been found in experiments that rats which may or may not be more susceptible than human beings can usually withstand the repeated daily exposure of 100 mg/kg of DDT to the skin but are killed as a rule by 200 mg/kg.

Various factors influence the amount of exposure. The lower the pressure of the spray pump the less the exposure. When an operator sprays surfaces above his head the exposure is greater if the surfaces are

Wolfe H. R. et al (1959) *B. J. H. H. B. O. S.* 20: 1

FIG. 1. DIELDRIN SPRAY TEAM IN TAVETA PARE AREA OF EAST AFRICA



Reproduced by courtesy of W. J. H. ye

FIG 2 TROPICAL HELMET WITH PLASTIC NETTING
VEIL AND RUBBERIZED GLOVES FRONT VIEW



*h t co g aff d d by l t n k sh ld
pp ba k and ppe he tae s llast f e*

roughened absorbent or have already been sprayed the exposure is less. It is increased with temperature or when a water-dispersible powder is used rather than an emulsion.

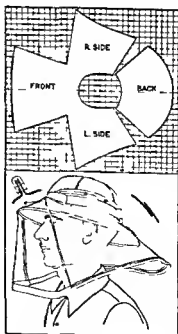
The actual exposure of spraymen in work in conditions in the field has been calculated in the Taveta Pare area of East Africa by three members of the East African Institute of Malaria and Vector borne Diseases at Amani Tanganyika (Bull Wild Hlth Org 1959 20 15). Dieldrin is used here not DDT. The men it was found are exposed to 1.8 mg of dieldrin per kg of body weight daily for 180 days a year with an interval of two months between spraying cycles. There have been no cases of poisoning.

Why is there no dieldrin poisoning in East Africa but poisoning in Ecuador (9/ of the workers) Venezuela (18/ of the

workers) and Nigeria (10/ of the workers)? The East African spraymen work on an average only six hours a day and for only 180 days a year. Their overalls are washed daily and 225 g of soap is issued to each man every week. In Venezuela some men worked as much as 15 hours daily for seven days a week with no break between spraying cycles. In Nigeria hours and spraying cycles were much the same as in East Africa but clothing was not washed as frequently and only 60 g of soap was issued every two weeks. Elsewhere overalls are not worn at all and the amount of skin exposed is much greater. There is considerable variation in the degree of observation of precautions.

Various trials were made in East Africa before the protective clothing at present

FIG 3 PATTERN AND DRAWING OF
PLASTIC NETTING VEIL SHOWING
TAPE ATTACHMENT TO TROPICAL HELMET



*The diagr ms und at d t ls fth fo t and ba k
e ms and th b as tape d t e f th m*

used (Fig 1) was adopted as a routine. It consists of a cap of impermeable material with a curtain round the back of the head which buttons at the neck in front and a plastic visor from the forehead down drill overalls to the wrists and ankles and rubber gloves of medium thickness. Tennis shoes should be worn instead of the gumboots shown in the illustration since the latter are

hard to clean. This clothing resembles that found suitably protective in the American experiment (Figs 2 and 3) except that in the latter a sun helmet and a plastic netting veil were regarded as more effective than a cap and visor because the helmet is light and does not interfere with the circulation of air—a most desirable characteristic in a hot climate—and netting is easier to clean.

EXECUTIVE BOARD TWENTY-THIRD SESSION

The Executive Board of WHO met for its twenty third session from 20 January to 3 February 1959 in Geneva. Dr P E Moore, Director of Indian and Northern Health Services, Department of National Health and Welfare, Ottawa, was the Chairman of the session; the Vice Chairmen were Dr A Habernoll, Ministerial Counsellor, Federal Ministry of the Interior, Bonn, and Dr C Diaz Collier, Director of Experimental Studies in Public Health, Ministry of Health and Welfare, Mexico City. Dr J Singh, Director General of Health Services, New Delhi, and Dr M Slim, Chef des Services techniques centraux au Secrétariat d'Etat à la Santé publique, Tunis, were Rapporteurs.

Declaring the session open, the Chairman paid tribute to the memory of Professor Andrija Štampar, Chairman of the Interim Commission of WHO and President of the First World Health Assembly, and welcomed those members who were attending an Executive Board session for the first time, namely Dr J Singh (designated by India), Professor E A Aujaleu (designated by France), Dr Cao Xuan Cam, alternate to Dr Le Van Khai (designated by Viet Nam), Professor M Etemadian, alternate to Dr Radji (designated by Iran), and Mr J D Lawrence, alternate to Dr Togba (designated by Liberia).

The Board had an unusually heavy agenda including a large number of technical and administrative items. Some items of more general interest are reviewed below.

Programme and budget for 1960

The Director General's proposed programme of activities and budget estimates for 1960 were examined by the Board and their adoption was recommended to the Twelfth World Health Assembly. The proposed effective working budget of \$16 418 700 shows an increase of \$1 251 960 or 8.25% over the revised budget for 1959. The proposed programme for 1960 reflects important new trends and changes of emphasis in the work of WHO as a result not only of the experience gained by the Organization during its first decade but also of the remarkable advances of medicine and allied sciences during the same period. One consequence of these developments is the widening of the concept of control to that of eradication in the case of such communicable diseases as malaria, smallpox and yaws and eventually of tuberculosis and leprosy. In addition a number of activities which in the past could be carried out only to a limited extent are to be expanded, e.g. vital and health statistics, services, nutrition surveys, the control of bilharziasis and research into cardiovascular diseases, cancer, onchocerciasis, arthropod-borne viruses, the epidemiology of mental disorders and the teaching of psychiatry and mental health techniques.

Malaria eradication

The Board heard a report on the present situation with regard to malaria eradication.

throughout the world. In southern Africa the spraying of residual insecticides has given encouraging results and a large scale WHO assisted eradication project is under consideration for the south eastern part of the continent. In tropical Africa despite successes in the Southern Cameroons a number of technical problems have arisen and a series of pilot projects is being undertaken to find out the best means of interrupting transmission of the disease. The cost of malaria eradication in Africa will be high and special steps will have to be taken to train enough personnel for the work.

The picture in the Americas is more encouraging. Eradication programmes covering practically the whole continent are planned. There is extensive international co-operation in eradication programmes and training facilities have been brought to a high level of efficiency.

In the Eastern Mediterranean Region eradication programmes are being carried out in Iran, Iraq, Israel, Jordan, Lebanon and the United Arab Republic (Province of Syria). Other countries which have been engaged in control work for a number of years are fast approaching the pre-eradication stage. There is a regional malaria training centre in Cairo and programmes are co-ordinated with those of neighbouring countries in the European and South East Asia Regions.

Eighteen countries and seven other political units in the European Region are free from malaria. In several other countries the disease has been virtually eliminated through country wide programmes. In ten of the thirteen countries with indigenous malaria programmes of total coverage are in operation. A WHO pre-eradication survey team has begun work in Morocco and it is hoped to send a similar team to Algeria in the near future. There is close co-ordination with the Regional Office for the Eastern Mediterranean for programmes in North Africa.

Malaria existed until recently throughout the South East Asia Region. It has already been eliminated from certain parts of Ceylon, India and Thailand. Almost all the governments in the Region have accepted the principle of malaria eradication but legislation

to facilitate spraying and surveillance operations has not been introduced except in Ceylon. The training of staff is being carried out on the regional level at malaria institutes in India and Indonesia and a malaria training centre in Thailand. There is still however a shortage of technical personnel. WHO has provided technical advice and international staff to a number of countries and has taken steps to promote effective collaboration between the governments, UNICEF and the US International Co-operation Administration (ICA).

In the Western Pacific Region anopheline mosquitos and consequently malaria are absent from one country and eighteen territories out of the fourteen countries and thirty four territories making up the Region. No information on malaria is available in respect of the Chinese mainland, North Korea, the Mongolian People's Republic, North Viet Nam and the Bonin, Cocos and Norfolk Islands. The estimated 44.7 million inhabitants of the remaining nine countries and thirteen territories are living in areas which are or used to be malarious. Of these only Singapore with a population of 1.4 million claims malaria eradication. Japan will probably achieve eradication in the near future and eradication campaigns in Cambodia, the Philippines, Sarawak and Taiwan are also far advanced. No definite eradication plans exist however elsewhere in the Region and there is an acute shortage of professional and technical staff except in the Philippines and Taiwan.

The Board called for an intensification of efforts towards malaria eradication and the free exchange of relevant information between neighbouring countries to facilitate anti-malaria measures in frontier zones.

On 15 January the Malaria Eradication Special Account fell short by approximately \$1.3 million of the amount required to finance operations for 1959 and by approximately \$8.4 million of the total amount required to finance operations in 1959 and 1960. Of the \$3,227,000 contributed by that date more than 90% had been contributed by one country namely the United States.

The Board therefore urged Member States to contribute to this fund or to increase their contributions to it and invited contributions from foundations, industry, labour organizations and private individuals.

Smallpox eradication

A report by the Director General on the financial, administrative and technical implications of a world wide programme of smallpox eradication was also considered by the Board. While definite progress has been made in large areas of the world after intensive vaccination campaigns, the disease still remains a serious problem in Asia and Africa. Since the eradication of smallpox from an endemic area can be accomplished by the successful vaccination or revaccination of 80 % of the population within four to five years, the Board recommended that eradication programmes be organized in all countries still needing them, along the lines suggested in the report.

Plan for an intensified research programme

The Eleventh World Health Assembly had asked the Director General to organize and arrange for a special study of the role of WHO in research and of ways in which the Organization might assist more adequately in stimulating and coordinating research and developing research personnel. The Director General's report on this subject was presented to the Board. It states that the expansion of international medical research is not only in accordance with the constitutional mandate of WHO but a logical development of its first ten years of work. Such a programme should be primarily concerned with major problems which local effort is inadequate to deal with either because of their magnitude or because the research potential of the area is low, as well as those better resolved by world wide co-operative endeavour than by local groups.

It has always been WHO's policy to operate through existing national organizations and this principle applies with particular force to research. The categories of

problem suited to international collaboration include those for which world experience is the unit of knowledge, e.g. demography, the genetic description of populations, the measurement of the incidence and prevalence of disease and the characterization of the range of environmental factors, both natural and artificial, communicable diseases prevalent throughout the world (e.g. tuberculosis and many virus diseases) or over large areas (e.g. malaria), unexplained variations in the incidence and prevalence in different parts of the world of such diseases as cancer, coronary thrombosis, hypertension, rheumatoid arthritis and diabetes mellitus.

A field to which WHO could make an important contribution is the standardization of material, e.g. antisera for the uniform identification of bacteria and virus strains, tissue culture media and standard cell strains grown in tissue culture in connexion with cancer and other research, etc. WHO could also do much to train research workers and facilitate exchanges of knowledge and experience between scientists, ultimately perhaps assuming the functions of a central international research organization. One important factor to be taken into consideration in an intensified research programme would be the establishment—in addition to the present advisory mechanism—of a scientific advisory body to the Director General in order to keep medical research as a whole and research strategy under consideration.

The Board endorsed the principles outlined in the Director General's report, a fuller study of the subject together with financial estimates will be submitted to the Twelfth World Health Assembly.

International Health and Medical Research Year

The Board discussed a resolution on an International Health and Medical Research Year adopted by the United Nations General Assembly and an associated proposal by the Government of the United States of America. It was the opinion of the Board that the observance by all countries of an International Health and Medical Research Year

" would result in an intensification of efforts in health and medical research work and would thereby further the objectives of the World Health Organization as established by its Constitution. The Director General was asked to submit a comprehensive report on all aspects of the subject to the Twelfth World Health Assembly.

Co-operation with UNICEF

The Board expressed its appreciation for the substantial support given to the malaria eradication programme by the United Nations Children's Fund (UNICEF) and expressed the hope that the latter would continue this support until world wide malaria eradication was achieved. Satisfaction was also expressed with the continuing close and effective collaboration between the two organizations in international health work generally.

Regional Directors

Dr Abraham Horwitz (Chile) was appointed WHO Regional Director for the Americas

succeeding Dr Fred L. Soper whose third four year term of office ended on 31 January. The appointment of Dr F. J. C. Cambournac as Regional Director for Africa was extended.

Darling Foundation Prize

The Board noted with appreciation the decision of the Darling Foundation Committee to award the sixth Darling Foundation Medal and Prize to Dr E. J. Pampana, formerly Director of the Malaria Eradication Division at WHO Headquarters. The presentation of this award, which was established by the League of Nations to honour the work of eminent malariologists, will be made by the President of the Twelfth World Health Assembly at a plenary meeting of the Assembly.

Place and date of next session

The twenty fourth session of the Executive Board will be held in Geneva starting on 1 June 1959.

Epidemiological and Statistical Information

CHOLERA IN 1958

In a note on the world cholera situation the WHO *Weekly Epidemiological Record* (No. 5, 1959) states that the incidence of the disease during 1958 was the highest recorded since 1953. About 93 000 cases were officially notified in Asia during the year as compared with 64 000 in 1957 and 242 000 in 1953. Epidemics occurred not only in India and Pakistan but in Nepal and Thailand as well.

The maps on page 132 show the incidence of cholera in these countries during 1958. In the lower Ganges Valley, East Pakistan accounted for 20% of all cholera cases notified during the year. In the upper Ganges Valley (Uttar Pradesh and Bihar) 11% of all cases were recorded while one half of all cases occurred in the central and southern parts of India in the States of Orissa, Madhya Pradesh, Bombay, Mysore and Andhra Pradesh. In Thailand, which experienced its first cholera epidemic since 1949, there were 9396 cases, of which 6175 were recorded in Bangkok and its neighbourhood. The epidemic in Nepal occurred in the Kathmandu area where 1950 cases were reported.

The Board therefore urged Member States to contribute to this fund or to increase their contributions to it and invited contributions from foundations industry labour organizations and private individuals

Smallpox eradication

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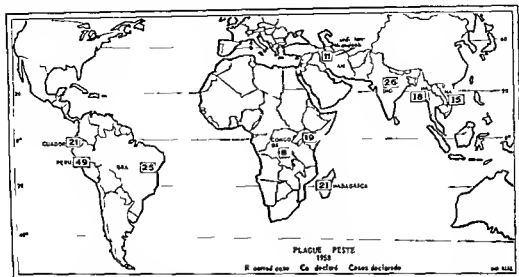
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PLAGUE IN 1958

The downward trend of plague incidence observed in recent years continued in 1958 when the number of officially recorded cases was the lowest since the beginning of the century. According to a recent issue of the *WHO Weekly Epidemiological Record* (No 3 1959) only 213 cases were officially recorded throughout the world in 1958 of which 26 were in India as compared with 569 (47 in India) in 1957 and 15 399 (8230 in India) in 1951.



The accompanying map shows the distribution of plague cases throughout the world in 1958. In continental Africa 8 cases were reported in the Belgian Congo and 19 cases in the Central Province of Kenya. In Madagascar 21 sporadic cases were recorded. Active foci in America were to be found in Brazil (State of Bahia), Ecuador and Peru. A new focus of 11 cases was discovered in the Kurdistan Mandoab area of Iran and the disease was again reported from Viet Nam. In Burma the number of reported cases fell from 198 in 1957 to 18 in 1958.

SIMPLE TABLES IN PUBLIC HEALTH PLANNING

Data which may be necessary or useful for planning public health activities are sometimes presented in complicated tables meaning hardly anything to the statistically untrained eye. As a result valuable information may be rendered inaccessible to many who could profitably use it in their daily work.

Often, however, simple statistical tables such as those on infant and neonatal mortal-

ity published in WHO's *Epidemiological and Vital Statistics Report* Vol 11 No 9 contain information which can be used both for the evaluation of past trends and for the planning of future health programmes on a national or international scale. This information is collected by WHO from the national health and statistical organizations; in some cases there may be a certain amount of bias

CHOLERA 1958 CHOLERA

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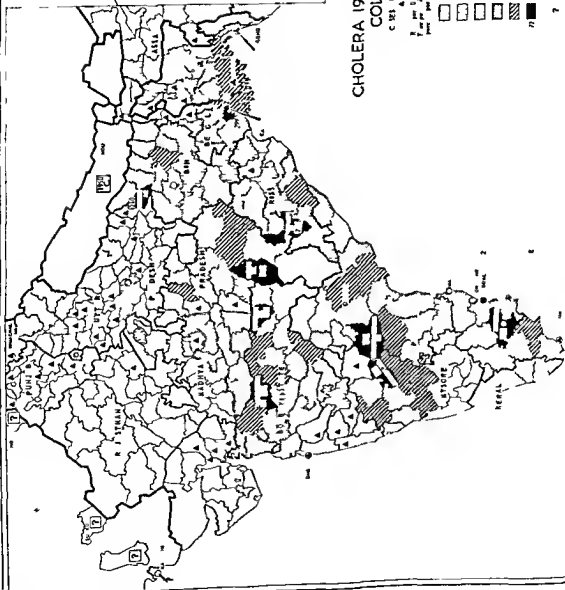
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Reports of Expert Groups

PUBLIC HEALTH TRAINING FOR FOREIGN STUDENTS

The development of public health services during the past ten years has been so rapid that it has not been possible for all countries to provide advanced training in public health to personnel required for key positions. The physician who wishes to make his career in public health who already practises in that field and desires to improve his knowledge or to take advanced studies in order to devote himself to teaching research or organizational work is thus often obliged to go to another country to obtain the training he seeks.

In view of the problems raised by the varied backgrounds of students from different countries the diversity of their aims in taking post graduate courses abroad and above all the differences between the public health requirements in their home countries and those of the countries in which they take the courses WHO submitted the matter for the consideration of an Expert Committee whose report has just been published¹. The conclusions of the Committee are in many cases applicable not only to foreign students but to those of the countries in which the courses are given.

Helping the student to settle down

The report opens with certain general considerations and goes on to examine in its human and technical aspects the problem of helping foreign students to settle down as members of the class.

The final responsibility for the selection of students rests with the school which is to provide the training. This means that it is

essential for the school to receive from the sponsoring organization or government a clear and detailed account of a student's educational background above all the purpose for which he is taking the course and the aspects in which he is particularly interested must be specified in such a way that there can be no possibility of misunderstanding.

Everything possible should be done to make the student feel at home. It will be desirable to allow him a certain amount of time before the course begins to get his bearings to make the acquaintance of his teachers to become familiar with the organization of the school and, if possible with the social and cultural life of the country. All this is especially important for students whose mother tongue is not the same as that of the country where the course is given.

Guidance on teaching and personal problems may be given by faculty members assigned as advisers to foreign students (or chosen informally by the students themselves) joint advisory committees of students and faculty members can also be helpful in this respect.

The new student should be encouraged to present material on public health problems in his own country and to take part in social life (clubs meetings etc.)

Evaluation of the student's needs

Training in schools of public health must keep pace with the continuous developments in this field. Since no objective criteria for the evaluation of training requirements have as yet been established it is necessary to rely upon subjective data and opinions from the members of the faculty the students themselves and the sponsoring countries and agencies.

¹ WHO Expert Committee on Professional and Technical Education of Medical and Allied Personnel (1959) Sixth report. The first on students and postgraduate public health courses. *Id. 11th Conf. An. Ser. N. 1959* 3 p. gen. Fin. 1959 30 30 or Sw. 1.

depending on the statistical methods used but not enough to alter the basic value of the data

It is well known that several countries have achieved very low infant mortality rates e.g. Sweden (16.9 per 1000 live births in 1956 17.1 in 1957) the Netherlands (19.0 in 1956 17.2 in 1957) the United States of America (26.0 in 1956 26.3 in 1957) etc. while the rates in certain other countries are approaching comparable levels. In many parts of the world however infant deaths still exceed 100 per 1000 live births annually e.g. in Tunisia (167.3 in 1956 126.8 in 1957) Chile (109.1 in 1956 117.7 in 1957) etc. Moreover there is evidence that infant mortality is even higher in vast areas of the world where there are neither medical services to reduce it nor statistical machinery to record it.

The neonatal mortality rates reported from the various countries show however a much smaller range of variation—thus the lowest reported rate is that of the Netherlands which had 11.9 deaths per 1000 live births in 1957 as compared to a maximum rate in Tunisia of 57.5 in 1956 (46.9 in 1957). This may to some extent be due to the presence of pathological factors common to the process of gestation everywhere rather than environmental factors acting after birth.

It is also interesting to note that in countries where infant mortality has decreased considerably in recent years there has been no comparable drop in the neonatal rates so that countries with low infant mortality rates have a definitely higher proportion of neonatal deaths than those in which total infant mortality rates are still high.

This tends to confirm the assumption that the causes of neonatal death have been far less influenced by recent progress in maternal and child welfare than have those of late infant mortality and points to the need for further research in this relatively unexplored field. In 1956 for example the proportion of neonatal deaths to total infant mortality was 76.9% in Sweden 71.2% in England and Wales 72.3% in the United States etc. In certain other countries however the picture is quite different in 1956 neonatal deaths represented only 29.2% of total infant mortality in Algeria 33.7% in Portugal 33.2% in Chile etc. These figures indicate where the public health authorities might profitably concentrate their efforts.

These data and the conclusions to be drawn from them are also helpful to WHO in planning and carrying out maternal and child health programmes in co-operation with national health authorities. Thus in Europe where activities in this field have reached a fairly high level the emphasis is on training and information activities such as fellowships national or regional seminars etc. Elsewhere however much more extensive practical help is being given often in co-operation with other international agencies such as UNICEF¹ in the form of mass campaigns against communicable diseases the establishment or improvement of maternal and child welfare centres nutrition and milk distribution programmes and health education—in short all the public health activities which may lead to a reduction in the number of infant deaths and the better growth and development of children.

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National participation in health programmes

The cost of an internationally assisted health programme cannot be reckoned in terms of the expenditure of international funds alone. An important element is the national contribution to the programme which in many cases would not have been made available but for the stimulus of international assistance. Thus last year WHO assisted national health programmes in 132 countries at a cost to the Organization of \$17 739 524 the national contributions to these programmes amounted to \$77 214 22.

accepted and applied in a routine manner without any critical analysis

Level of training of foreign students

As a rule the requirements for admission to a school of public health are based on the level of training of students in the country in which the school is situated. In the case of students with different basic training certain exceptions are usually made with respect to admission requirements and this practice should be continued. Once admitted however students should be expected to attain the normal level of performance required by the school for a degree though

this may not always be possible. A special certificate might be awarded to those who have done good work but have been unable to attain degree level

General principles for post-graduate public health training

The report includes a recommendation for the establishment of minimum requirements or general guiding principles applicable to post graduate training in public health throughout the world, the evaluation of existing schools of public health, and the creation of new ones would undoubtedly be facilitated by this measure

ADDICTION PRODUCING DRUGS

The ninth report of the Expert Committee on Addiction Producing Drugs¹ contains recommendations relating to the international control of the following narcotic drugs: nicomorphine, normorphine, oxymorphine, levomoramide and dimenoxadol, all of which are considered to qualify for the same degree of control as morphine. In its fifth report the Committee had recommended that it was desirable to avoid the manufacture, import and export of oxymorphine, but this recommendation is now withdrawn since in the light of subsequent clinical experience it appears that the addiction producing properties of oxymorphine cannot be considered more dangerous than those of other drugs comparable to morphine.

Two requests for the exemption from control of preparations containing the narcotic drugs normethadone and dioxaphetyl butyrate are considered. Although the Committee agreed that the use of these preparations in the recommended medicinal doses would not be likely to lead to the production of addiction, it is pointed out that they could be taken in much larger doses and more

frequently than recommended. At present there is insufficient experience to set a limit of concentration for the exemption of preparations containing normethadone and dioxaphetyl butyrate and the report therefore recommends that the requests for exemption should not be granted.

The Committee was concerned about the possible dangers of the prolonged use and potential misuse of certain non opiate analgesic mixtures containing phenacetin and other agents such as aminophenazine, caffeine and a sedative which are potentially habit forming. Under certain conditions the excessive use of such mixtures has presented characteristics approaching those of addiction and the Committee felt that the situation needs to be watched closely.

Another cause for concern is the steadily growing consumption of codeine and diionine which does not seem to be due entirely to population increases. It is conceivable that the use of these drugs in cough medicines is partly responsible and attention is drawn to the possibility of replacing them by non addicting antitussives such as noscapine and dextromethorphan.

The report makes a plea for the use of international non proprietary names for narcotic drugs and suggests that where a chemi-

WHO Expert Comm. on Addiction Producing Drugs
(1959) Ninth report (1st 4 Org. in Rep. Ser. N. 160)
15 pages. Price 1/6 50 50 S. 1/1 — Also published in French
d 5 — ash.

In the first place teachers must make themselves as familiar as possible with public health conditions in their students' countries of origin. For this purpose the system of awarding fellowships to teachers in schools of public health is an excellent one. In the case of senior faculty members these fellowships can be combined with advisory services to the public health authorities of the countries visited. In addition teachers should regularly evaluate their courses and the relative usefulness for their students—including those from abroad—of the subjects taught.

Secondly, official and non official opinions may be obtained from the sponsoring agencies. In some schools this is done through advisory committees composed of directors of the organizations or health administrations concerned. As an alternative the international agencies might send experts to the schools. Meetings of directors of schools and heads of health departments might also be arranged.

Finally the views of the students themselves might be obtained by means of questionnaires or interviews. This should be done when the student's opinion has had time to mature but before it is out of date from two to five years after graduation would probably be the best time.

Curriculum

After recommending methods for evaluating the needs of foreign students the report deals with the way in which courses should be planned and organized in order to meet those needs. It first of all specifies the subjects which should be taken by all students (biostatistics, epidemiology, public health administration and environmental sanitation) the rest of the programme being made up of optional subjects selected according to the students' particular needs. Instruction and work in small groups are especially valuable for foreign students in the practical work. Examples of a universal nature should always be used with references to conditions in the students' home countries. The various members of the health team should be trained together in subjects of common

interest. The programme should leave the student sufficient time for library work, research and private study.

As well as making the curriculum adaptable so that it may meet the particular needs of each student it might be advisable to add to the content of the courses. In the first place the study of administration should include the principles of economics, banking and taxation and methods of administrative research, planning and evaluation as well as the various systems of financing and organizing medical care. It will also be necessary to provide for the training of students who wish to devote themselves to teaching or supervision and to offer as complete a training as possible in the basic principles of environmental sanitation. Instruction in new aspects of public health (the utilization of atomic energy with the health hazards and problems it implies, the problem of resistance both to drugs—as in the case of certain antibiotics—and to insecticides) should be available. While the usual post graduate public health course lasts for one academic year the expanding curriculum may make it necessary to extend it in some cases.

More attention should be paid to the practical aspects of public health studies. In so far as the foreign student is concerned practical work will be more valuable when it is done in economic, social and cultural conditions equivalent or similar to those of the country in which he is to exercise his profession. Some experience of applying theoretical principles in unfamiliar situations may however be useful. In countries where for any reason it is considered impracticable to set up schools of public health, teaching community health centres might be attached to medical schools. Students who have taken their public health training abroad could use these centres for their field practice.

One of the aims of post graduate training should be to prepare students for research activities by developing personal aptitudes for creative work and original thinking. The report stresses this aspect of training in relation to public health administration since it will permit the student to evaluate administrative techniques which may have been

supply a base line with which the results of later surveys may be compared. During the planning phase and the early part of the attack phase many of the traditional techniques of malarionetrie survey such as the determination of spleen and parasite rates may be used. The weight to be given to such surveys will vary according to local conditions and will tend to diminish as the campaign progresses though they may furnish valuable data for deciding when spraying can be discontinued.

Once the attack phase starts malaria becomes a dynamic condition and the techniques of evaluation must be modified accordingly. Malarionetrie survey gradually merges into surveillance which the report defines as that part of the eradication project designed to discover any evidence of transmission to establish its nature and causes to eliminate residual foci to prevent or cure any residual or imported malaria infections that would delay the ending of transmission or threaten its resumption and finally to substantiate that eradication has been achieved.

Epidemiological surveillance

The report attaches particular importance to this method of evaluation and describes in detail the four main techniques: passive detection of cases, active detection of cases, entomological investigations, and epidemiological investigation of cases. Of these the most important are the active and passive detection of cases.

Passive detection means the notification of cases or suspected cases by members of the medical profession or non medical voluntary workers. Although essential to some degree in all campaigns the extent to which passive detection is feasible depends on the social educational and economic standards of the population and on the availability and degree of co-operation of medical and other suitable personnel. Active detection is primarily a process of house-to-house visiting to take blood films and is especially necessary in places where infections are often unassociated with clinical manifestations and so might

escape passive detection. The two techniques cannot be quite dissociated however as active enquiry may be made in villages to supervise and assist those participating in passive search.

During the early part of the attack phase active detection may be confined to indicator districts but the report recommends that as soon as possible and certainly throughout the consolidation phase active detection should be extended to all areas except those in which passive surveillance has been proved adequate. In many cases active detection alone may provide sufficient information on which to base the criteria of eradication. Disadvantages of active detection are that it may be relatively costly and that it provides a discontinuous service. Consequently there may be some loss of efficiency and possibly failure to gain local confidence. Monthly visits to villages probably represent the optimum frequency in most instances but for special reasons it may be desirable to make the intervals longer or shorter.

Where the blood films are sent to a central or regional laboratory for diagnosis it is important that the findings should be transmitted back to the field as quickly as practicable. A normal interval of not more than 72 hours being recommended. However when a drug has been given with the object of preventing transmission the report suggests that an interval of up to seven days may be allowed.

To ensure that surveillance is properly carried out there must be adequate supervision at all levels. Malarionetists should supervise the work of dispensaries, hospitals and laboratories which are under the direction of medical graduates and they should also discuss with medical practitioners all cases which they report and all death certificates giving malaria as the cause of death and demanding special enquiry. Dispensaries in the charge of nurses or other non medical personnel should receive periodic visits from malaria inspectors while passive surveillance undertaken by voluntary collaborators may be supervised either by malaria inspectors or by surveillance agents. House to house visiting by surveillance agents should be under the constant

cal name is used it should be identical with that which appears in the lists of international non proprietary names published in the *WHO Chronicle* and by the United Nations Commission on Narcotic Drugs or should be consistent with the principles applied to other drugs in these lists. In this connexion reference is also made to the value of the

Multilingual list of narcotic drugs under international control drawn up in 1958 by the United Nations. It is proposed to prepare regular supplements to keep this list up to date.

The report concludes with some comments on the third draft of the proposed single

Convention on Narcotic Drugs. Among other points attention is drawn to the seriousness of placing substances in Schedule IV because of a possible hampering effect on medical practice. The risk to public health says the report should be weighed against outstanding therapeutic advantages.

There are two annexes to the report one describing a new technique for determining the development of physical dependence and tolerance when analgesics are used in the treatment of physical pain. The other outlining the progress that has been made in establishing a centralized source of classified information on narcotic drugs.

MALARIA ERADICATION

A malaria eradication programme calls for continuous evaluation not only as a check on the effectiveness of the measures applied to prevent transmission but also to establish when transmission has ended when spraying may be discontinued and when the goal of eradication may be considered to have been achieved. The seventh report of the WHO Expert Committee on Malaria¹ which is summarized below is particularly concerned with the criteria for establishing each of these three end points and with the techniques of survey and surveillance by which the necessary data are collected.

The criteria

Interruption of transmission of malaria is not easy to establish conclusively particularly in the earlier stages of the attack phase of a campaign. The report emphasizes that the only true measure of the interruption of transmission is the absence of new infections in the population under consideration and that this can only be established by a full epidemiological enquiry and not by any simple form of random survey.

Before spraying can be discontinued it is necessary to demonstrate not only that transmission has been interrupted but also that the reservoir of infection (number of persons with malaria parasites in the blood) has been depleted to the point where endemicity cannot be readily re-established. This necessitates a reasonably intensive search over large areas of country. It may be assumed however that any small residual foci which may exist will eventually be discovered and eliminated. Once this has been done and adequate surveillance over a period of three consecutive years has established that there is no evidence either of transmission or of residual endemicity eradication may be considered to have been achieved. It is important however that during the last two years of surveillance neither chemotherapeutic cover nor specific general measures of anopheline control should have been applied.

Survey

In the planning stage of an eradication campaign malariometric surveys are indispensable their function being to establish the general epidemiological pattern or patterns. The findings may influence both the form and the length of the attack phase and they also

WHO Expert Committee on Malaria (1959) S. 36
(16th Hlth. Org. R. P. S. N. 162) 50 pag. 1. Pr.
\$0.60 Sw. f. 2. — Also published in French and Spanish.

believe that both types of resistance might not develop simultaneously in one and the same area in one or more anopheline species in which case no residual insecticide now in current antimalaria use could meet the situation

The report makes the following recommendations for an expansion of laboratory studies on resistance

(a) establishment and study of colonies of resistant and non resistant strains of the same species in a few selected, suitably located and adequately staffed laboratories

(b) further investigations on the range inheritance and mechanism of resistance in anophelines

(c) correlation of the effect of different insecticides and the properties of mixtures of insecticides

If physiological resistance to an insecticide has been proved beyond doubt the report recommends that a change be made to an insecticide of the other group of chlorinated hydrocarbons which should be used in standard doses and cycles unless there is convincing evidence that lower dosage would be effective. If the alternative insecticide is not immediately available or if there is proof of resistance to both groups of hydrocarbon insecticides it is recommended that mass chemotherapy should be put into operation without delay. The development of new insecticides, such as the organophosphorus compounds may afford other possibilities however

A problem allied to that of resistance is that of behavioural avoidance of insecticides. The report recommends that where the vectors show clear evidence of such behaviour and it can be definitely proved that interruption of transmission is being thereby prevented spraying should be continued with the same insecticide but experiments should be carried out to determine whether shorter spraying cycles or a change to another insecticide would help in reducing transmission. At the same time mass chemotherapy should be instituted and full use made of antilarval measures wherever practicable

Chemotherapy

Widespread experience has shown that, especially in the later stages of an eradication campaign antimalarial drugs can be used not only to accelerate elimination of the parasite reservoir and interruption of transmission but also to deal effectively with residual foci and with imported and migratory cases. The use of chemotherapy in cases where spraying is ineffective has already been mentioned. The report stresses the need for discrimination in the use of antimalarials however in order to avoid wastage of energy and funds. It is recommended that during the attack phase every fever case should be given the standard single-dose treatment and, provided that the number of cases with parasitaemia is small radical cure should be attempted. This procedure is even more necessary during the consolidation and maintenance phases.

The most effective and widely used drugs are chloroquine and amodiaquine. In semi-immune subjects single-dose treatment with either of these drugs gives clinical relief in all forms of malaria and effects radical cure in most *falciparum* infections. The effect on transmission is slow or doubtful however so that additional treatment with an agent that will prevent transmission is desirable. It is recommended that a special effort should be made to develop a drug or combination of drugs which in a single dose will produce without risk radical cure of all forms of malaria and at the same time prevent transmission.

Reference is also made to recent studies on the value of medicated salt for administering antimalarial drugs. It is concluded that the use of this method is likely to be confined to those exceptional circumstances in which other methods are not readily applicable.

Other problems

The reduction in efficiency of insecticides due to sorption on mud walls has been under study for some time. The report points out that since most houses with mud walls have

supervision of malaria inspectors and other supervisory personnel

Research in relation to surveillance

The report includes a number of suggestions for studies aimed at improving and elaborating the techniques of surveillance with a view to the more efficient conduct of eradication. For instance it has been observed in some regions that *Plasmodium vivax* infections have disappeared much more quickly than had been expected following interruption of transmission. This indicates the need for studies on the duration of infectivity of the different species of malaria parasite in the human host. There is also a need for more precise knowledge regarding the number of clinical parasitic and infective relapses to be expected in old cases after the start of the attack phase. The relationship between parasitaemia and clinical effects deserves special investigation since it has a considerable bearing on the techniques of surveillance. There is evidence from field research that the number of days of asymptomatic parasitaemia differs greatly from the number of days with fever. Consequently it is not sufficient for surveillance purposes to take blood from fever patients only; it should also be taken from subjects who have had fever in the interval since the previous visit.

Other subjects recommended as deserving study are the proportion of fever cases with no other obvious diagnosis attributable to malaria under various circumstances; the relative densities of gametocytes in the blood of patients with symptomatic and asymptomatic infections; and the relationship between gametocyte density and infectivity to mosquitos.

The pre-discontinuation phase

Towards the end of the attack phase the following epidemiological measures should be carried out:

- (a) active search to discover malaria cases in each village or locality
- (b) determination of the origin of the cases discovered

- (c) recommendation of suitable measures to inactivate such cases as a source of infection

The investigation should be based on a clinical history, blood examination and entomological investigation and should extend to members of the patient's family to non relatives living in the same house with him and to neighbouring houses. The report recommends that cases should be tabulated by the malaria eradication organization according to whether they are indigenous, sporadic, induced or introduced, and that positive and suspected cases should be tabulated separately. Positive cases should be reported through the authorized department of the health services so that they may be transmitted to WHO for international reporting.

These epidemiological investigations form a necessary prelude to the discontinuation of spraying, as only in this way is it possible to establish that the reservoir of infection has been reduced to the point where transmission cannot be readily re-established. It is important however that such measures should also be continued after spraying has been stopped in order that any residual foci or new infections may be quickly discovered and dealt with.

Resistance to insecticides

The wide occurrence of resistance to insecticides in various vector species of *Anopheles* was already the subject of discussion in the sixth report of the Expert Committee on Malaria, and since that time many fresh instances have been discovered. An annex to the seventh report summarizes all the information received up to September 1958 on confirmed cases of resistance to chlorinated hydrocarbon insecticides. Resistance has proved to be strong enough to give the insect complete protection against the insecticide, and furthermore genetic studies have shown that resistance to DDT and its analogues is quite different from resistance to dieldrin, chlordane and BHC. There is no reason to

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Notes and News

The influenza situation

Although up to mid February the winter of 1958/59 had witnessed no major influenza epidemic in Europe there was a sharp rise in the incidence of the disease in several European countries during the first six weeks of the year.

In England and Wales a number of localized outbreaks of respiratory infection were reported at the end of January and by mid February the number of notifications of pneumonia and deaths attributable to influenza had risen sharply. A type virus similar to the Asian strain was found in at least six centres and B type virus in at least five centres. The results of serological tests suggest that most of the outbreaks particularly in younger persons were due to a B type virus.

The incidence of influenza like illnesses in Switzerland rose sharply in certain cantons during the second week of January. Similar outbreaks localized at first but subsequently spreading throughout the country have occurred in France these outbreaks have been mild and the cause of infection is still being studied. A B type virus was found in Paris and in the west centre and east of the country.

In the first weeks of February there was a marked rise in the incidence of a mild influenza like disease among Danish school children. Serological examinations suggest that this outbreak was also due to a B type virus. In the Netherlands type B influenza has spread rapidly particularly among children. pneumonia has been rare but a few deaths due to staphylococcal pneumonia have been notified.

Outbreaks were reported from several other parts of the Northern Hemisphere but again there had been no major epidemic up to mid February. In Canada several outbreaks of acute respiratory infections were notified during January in Alberta, British Columbia

the North West Territories, Newfoundland and Prince Edward Island. Local influenza epidemics have been noted in various parts of India. Investigations in all cases except one have shown A2 (Asian) strains to be responsible. The incidence of influenza in the Eastern Mediterranean countries this winter has been at a normal level. In the United Arab Republic (Province of Egypt) 893 cases were reported between 1 September 1958 and 8 February 1959 as compared with 4823 during the corresponding period in 1957/1958.

An improved immersion medium for microscopy

In a campaign for the eradication of malaria it is particularly important to detect and treat cases of malaria when the stage of attack on mosquito vectors with residual insecticides is over for an undetected untreated case could jeopardize the whole campaign by infecting mosquitos and thus forming the starting point of an epidemic. In the surveillance phase of the campaign it is therefore vital to examine the blood of fever cases for malaria parasites. The amount of work created by the examination of a large number of slides may however be so great as to constitute a bottleneck in the programme. Consequently any improvement in the technique of microscopy that will simplify the examination of slides deserves the closest attention.

One of the common immersion media used for the examination of blood slides is cedar oil which has very nearly the same refractive index as the glass of the high power objective of the microscope. Cedar oil and the other

While this number of the Chronicle is in preparation, reports were received from WHO of further increases in the incidence of influenza in several countries, including Bulgaria (here it is an unusual virus A2 was isolated), Czechoslovakia, Denmark, the German Federal Republic, Sweden and the United Kingdom. For details of these developments, see the WHO Weekly Epidemiological Record.

roofs of non sorptive material the ideal insecticide would be one that combines the fumigant properties of BHC on sorptive surfaces with the prolonged contact action of DDT or dieldrin on non sorptive ones. Laboratory studies on dieldrin formulations which might have a longer residual effect when applied to sorptive surfaces have yielded promising results and extensive field trials are now under way.

In many countries malaria eradication operations are hampered by the presence of nomadic tribes or seasonal migrants. A similar problem is posed by dispersed groups such as labourers woodcutters lumbermen or fishermen living in summer huts or temporary shelters. Such groups may not be reached by the spraying teams and may continue to serve as scattered foci of infection. The report stresses the importance of regular spraying of the tents and temporary shelters with suitable insecticide formulations and suggests that tribesmen should be trained as auxiliaries to surveillance agents wherever possible. When the tribes are in their fixed sites mass drug therapy should be instituted perhaps with medicated salt.

The success of a malaria eradication campaign may also be jeopardized by failure to secure the full support and co-operation of the population. Intensive health education combined the report suggests with methods used in public relations activities is therefore essential. But a malaria eradication programme needs not only the support of the community but also the collaboration of many governmental and private agencies professional groups and lay persons and it

must be protected against political changes and economic drawbacks. A very large number of groups have therefore to be approached and imbued with a sense of responsibility for the success of the campaign. The report lays particular stress on the role of the school teacher since the whole school system provides a ready co-ordinated organization for the collection and dissemination of information.

As already stated in the sixth report of the Expert Committee on Malaria efficient management of malaria eradication demands that the administration should be distinct from that of general public health administration. There is not considered to be any justification for modifying this view although the possibility is allowed that the programme might be organized within the framework of the general public health administration in countries where this is decentralized.

The report concludes with a summary of the recommendations contained in the fifth report of the Committee on International Quarantine⁴ regarding international protection against malaria. These recommendations are based on those made by a WHO Study Group convened in 1957 to examine international aspects of malaria control. The Expert Committee on Malaria endorsed the recommendations made and expressed the opinion that the action taken meets the present needs. It particularly emphasized that as more and more countries approach the goal of malaria eradication the need for inter-country co-ordination is becoming increasingly important.

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A book on world health

A recent addition to the Pelican Medical Series published in England by Penguin Books Ltd is a volume entitled *World Health* in which Professor Fraser Brockington of Manchester University discusses public health problems and their relationship to such complex factors as geography beliefs and customs family life population occupation town living hospitals food and industrialization. Dr M G Candau Director General of WHO has contributed a Foreword to this publication which contains a special section on WHO and its work.

had started late because of a delay in the arrival of the DDT

Antityphus campaigns continued to be carried out, not only in Afghanistan but also in Pakistan which had had epidemics in two districts of the North West Frontier Province in 1955-56 and in 1956-57. In 1958 a WHO entomologist-consultant visited the two countries to assess progress. The Pakistan programme is confined to the North West Frontier Province and includes dusting of Afghan nomads, Pakistani nomads and the inhabitants of some villages. Operations begin in October and reach a peak between mid-November and mid-December. The pavindas are treated at eight points of entry into Pakistan, the Pakistani nomads at five points of exit from the mountains in which they live. In Afghanistan approximately 7 000 000 people have been dusted in each of the past two seasons. In Pakistan no resistance to DDT has been encountered but lice in the Kabul area and Jalalabad jail in Afghanistan have developed a moderate degree of resistance to this compound.

After his survey the WHO consultant made various recommendations for additional dusting posts for the re-siting of some existing posts for resistance studies for improvements in the technique of dusting for changing from ODT to gamma BHC in the Kabul area (with a later change to malathion if WHO approves this drug) for the inclusion of certain other villages in the programme and for a further entomological assessment in the autumn of 1960.

Daily epidemiological radio bulletin

On 27 January 1959 the daily epidemiological radio bulletin transmitted by WHO from the Genève Prankins station of Radio Suisse S.A. completed its first ten years.

The idea of a radio bulletin which would provide health administrations with information to guide them in their quarantine activities was not a new one since a weekly epidemiological bulletin for health administrations in Asia had been started in 1935 by the predecessor of the present WHO Epidemiological Station at Singapore. The Geneva

bulletin however extended this idea by providing daily information on a world wide basis.

The bulletin contains official information received by WHO in Geneva on (a) the occurrence of the quarantinable diseases i.e. plague, cholera, yellow fever, smallpox, typhus and relapsing fever in ports and airports; (b) declarations of areas as infected with quarantinable disease or free from such infection; (c) cases of quarantinable disease in localities other than ports and airports; and (d) outbreaks of non-quarantinable diseases if of sufficient international interest.

An enquiry made in 1953 revealed that about forty health administrations throughout the world had permanent arrangements for the regular reception of the bulletin; others relied on it when information of special interest to them was anticipated.

The contents and length of the daily bulletin vary with the seasonal incidence of disease in spring (Northern Hemisphere) reports on the spread of smallpox mainly from endemic areas in Asia may predominate to be followed during the summer months by reports on the spread of cholera while the bulletins broadcast in winter are likely to contain information on influenza trends.

During influenza epidemics the bulletin has proved especially useful to health administrations by providing them with an authoritative up-to-date survey of the situation. During the 1957 pandemic for example the information given in the bulletin often helped to counteract exaggerated or sensational press reports.

The entry into force of the International Sanitary Regulations in 1952 extended the scope and importance of the bulletin. Notifications under the Regulations have enabled WHO to specify with greater precision the areas where quarantinable diseases are present.

The bulletin is sent out in morse by eight transmitters, two omnidirectional transmissions (short wave and long wave) cover Europe while six special beams permit short wave coverage of Africa and the Mediterranean area, South East Asia and Australasia, the North West Pacific, South

ordinary immersion oils are messy and if the slide has to be re examined they must be removed by xylene which frequently leaves an iridescent film that interferes with the re examination and with repeated use discolours the Giemsa stain. In tropical areas cedar oil thickens quite quickly and often the xylene fails to dissolve it completely leaving a granular birefringent layer which prevents identification of the parasites. Finally dry cedar oil is difficult to remove.

These are considerable disadvantages to the laboratory technician who is in a hurry and various ways of overcoming them have been devised by no means all of them satisfactory. But there have been in existence for a considerable time compounds which have none of these disadvantages and yet surprisingly have not replaced the traditional media to any marked extent. These are methyl benzoate also known as oil of Niobe and methyl phenyl ether commonly called anisol or anisole. They were first described in 1925 by Beeher a professor of zoology in Giessen who drew attention to the many advantages they and particularly anisol possessed over cedar oil. Anisol is not greasy or sticky does not harden and volatilizes slowly from the slide. Its effect on Romanowsky stains is negligible and its refractive index is close to that of cedar oil. Its drawbacks are minor it is more fluid than cedar oil and so may flow if the slide is tilted it may soften the mounts of some older types of microscopes (the makers should be consulted on this point) and because of its higher chromatic aberration it should not be used for high definition photomicrography. But for ordinary laboratory microscopy in the view of Dr Bruce Chwatt Chief Planning Section Division of Malaria Eradication WHO (*Bull. Wld Hlth Org* 1959 20 151) these are not important drawbacks compared with its obvious advantages.

Typhus in Afghanistan and Pakistan

Typhus is endemic in Afghanistan particularly in the provinces of Kabul and Kandahar and every winter used to bring an epidemic since a large part of the population

whose living conditions were already far from satisfactory crowded together in small dwellings to keep warm. In hot climates the wearing of little or no clothing exposure of the skin bathing and the lethal effect of high temperatures on lice prevent the spread of the disease but in Afghanistan and north west Pakistan the winters are very cold bathing is reduced to a minimum the skin is kept covered as much as possible and overcrowding in small houses facilitates the transfer of infected lice from person to person.

The danger of typhus epidemics is not limited to these areas however. Every year in or about October tribes of Afghan nomads the pawindas travelling with tents camels horses and families cross the Afghan border and penetrate for great distances into Pakistan trading skins and rugs for foodstuffs and other wares which they take back into Afghanistan at the beginning of the hot weather. These tribes carry lice and mingle with the local population at just the time when the winter cold compels the latter to move indoors thereby often creating conditions very similar to those of the endemic areas of Kabul and Kandahar.

In 1949 there was an epidemic of typhus in Afghanistan and WHO sent an expert consultant to investigate the situation. In the winter of 1950-1951 following news of successful delousing in South America by dusting the body and clothing with 10% DDT powder the first antityphus campaign was begun by a WHO malaria control team in the cities of Kabul and Kandahar with such success that the Government of Afghanistan received petitions asking for operations to be extended to other parts of the country.

In 1951 the Government of Afghanistan UNICEF and WHO launched a large scale joint campaign against typhus¹. The campaign lasted through the winter 312 832 persons being dusted with 10% DDT powder in the provinces of Kabul and Kandahar and 70 000 in other provinces. During that winter not a single case of typhus occurred in the city of Kandahar and only four in the city of Kabul even though field operations

international spread of disease with the minimum interference with world traffic

A number of other questions were discussed by the Committee including the disinsecting of aircraft and international protection against malaria

Mental health in Africa

An assessment of the mental health situation in Africa south of the Sahara was made at a meeting of experts held in Bukavu Belgian Congo in 1957 by the WHO Regional Office for Africa the Commission for Technical Co-operation in Africa South of the Sahara and the World Federation for Mental Health. The data collected at this meeting provided the background material for a mental health seminar which took place in November-December 1958 at Brazzaville French Equatorial Africa under the auspices of the same organizations.

The Brazzaville seminar was attended by some 30 psychiatrists social scientists and public health administrators from various parts of the African Region. The discussions were mainly concerned with education and training in mental health work and the organization of services. Specific topics included the need for training specialized personnel even before hospitals are built the role of psychologists and social scientists in training such personnel the acceptance of mental health services by the community therapeutic use of work and leisure time.

Food borne diseases

Thanks to the development of water supplies sewerage systems and sanitation in general certain enteric diseases such as typhoid and paratyphoid are on the decline in Europe. Large scale outbreaks of food borne diseases are however becoming relatively more frequent. This situation is largely due to the growing use of processed and "ready-to-serve" foods particularly in restaurants and canteens.

A Technical Conference on Food Borne Infections and Intoxications was held in Geneva by the WHO Regional Office for

Europe from 16 to 21 February 1959. The topics discussed included the co-operation of public health administrations hospital services and laboratories in detecting and combating food borne diseases methods of epidemiological investigation control and prevention the control of imported foods both in the producing and importing countries administrative aspects of the problem such as licensing regulations the laboratory examination of food and the control of primary sources of food (farms abattoirs etc.).

The following countries were represented at the Conference: Denmark France Greece Italy the Netherlands Norway Poland Switzerland and the USSR. Representatives of FAO the WHO Regional Office for Europe and WHO Headquarters also took part.

Health and welfare services for seafarers

A conference was convened at Marseille by the WHO Regional Office for Europe in co-operation with the French Government from 16 to 21 February 1959 to investigate present European practices in the field of seamen's health and welfare. It was attended by medical officers responsible for health services for seafarers medical superintendents of shipping companies and ships surgeons and physicians. Twelve countries were represented: France Federal Republic of Germany Greece Italy the Netherlands Poland Portugal Sweden Turkey the United Kingdom the United States and the USSR. Representatives of the UN Technical Assistance Administration ILO the Inter-governmental Maritime Consultative Organization and the United Seamen's Service were also present.

The topics discussed included health services ashore health services on board ship mental health problems dental health social work for seafarers in France and health centres for seafarers in Norway. The findings of the conference will be included in a world wide survey of seafarers' health and welfare problems which has been undertaken by WHO.

America and West Africa and Central and North America. On certain days of the week the text of the bulletin is repeated in whole or in part from other stations for better reception in certain areas. Thus it is retransmitted by Abu Zabal (Cairo) station on Fridays by Saigon station on Saturdays and Wednesdays and by Tokyo Usui station on Saturdays.

WHO Centre for Authentic Chemical Substances

During 1958 there has been a substantial demand from all parts of the world for each of the eight specimens now held for distribution at the WHO Centre for Authentic Chemical Substances Apotekens Kontroll laboratorium Stockholm. The original stock of one of the substances, di-tubocurarine, was nearly exhausted but is now being replaced. Another substance, beta-carotene, is also nearing exhaustion but there are no plans for renewing the stock since it is primarily used for testing foods rather than checking the quality of drugs.

The Centre is investigating the possibility of providing a series of authentic chemical substances intended to serve as standards for the determination of melting points, as recommended by the WHO Expert Committee on the International Pharmacopoeia. In addition, the provision of a series of standards for calibrating spectrophotometers—also recommended by the Expert Committee—is under study.

Changing immemorial custom

In many villages in the less developed parts of the world women still go with pitchers to the well to fetch water, as they have done for thousands of years. The water is raised by a variety of devices, most of which are primitive in the extreme, involving a maximum of effort for a minimum of result and leading to fouling of the surrounding area with pollution of the water in the well. Rural sanitation schemes seek, as one of their aims, to make the water supplies of the villages easy to get at and safe to use while keeping the cost of any installations low.

For several years WHO has been assisting the Government of Ceylon with a rural sanitation project based at Kurunegala. The project team has now devised a simple type of chain lift pump made of materials locally available which could easily be enclosed to prevent contamination of the well. It consists of a continuous chain moving down into the well to below the water surface, up through a galvanized lift pipe over a wooden pulley at the top, then down again into the well. The chain carries rubber washers of the same diameter as the lift pipe which are fitted along the chain at intervals of about 38 cm (15 in). When the pulley rotates, the closely fitting rubber washers moving upward inside the pipe lift the water which is discharged through a special outlet at the top of the lift pipe.

The component parts are made of wood, galvanized iron chain or wire and rubber (from discarded tyre tubes), all readily available. The total cost of the first pump was US \$20, but later pumps cost less and one has been made for as little as US \$6. This type of pump is thus very economical and it is also popular, easy to use and requires little maintenance. Further details are obtainable from the Division of Environmental Sanitation, WHO, Geneva.

Obstacles to international travel

The application of the International Sanitary Regulations as it affects international travel is examined each year by the Committee on International Quarantine. The last meeting of this Committee was held in Geneva from 20 to 24 October 1958.

Following the cholera and smallpox epidemics in Asia at the beginning of 1958, several countries took quarantine measures going beyond those authorized in the Regulations. Through the efforts of the Director General of WHO, most of the difficulties arising from these measures were smoothed over and the intervention of the Committee was confined to reminding all countries that the essential aim of the Regulations is to ensure the maximum security against the

People and Places

New Director of Health Services for South East Asia

Dr Lucien Bernard, a French public health expert, has been appointed Director of Health Services in the WHO Regional Office for South East Asia. He will advise the Regional Director on the technical aspects of all health activities in the Region and on the planning and execution of general and special health surveys. He will also attend the request of Member States provide consultative services for government health programmes.

Dr Bernard studied medicine at the Medical Faculty of the University of Paris, subsequently specializing in microbiology at the Pasteur Institute, Paris. Prior to his new assignment he was Assistant to the Director-General of Health Ministry of Public Health and Population, Paris. He has attended most of the sessions of the World Health Assembly and the WHO Regional Committee for Europe as a member of the French Delegation, and has been a member of the WHO Executive Board.

Sanitary engineering in the Philippines

Since 1955 WHO has been helping the Government of the Philippines to strengthen the central environmental sanitation services of the Department of Health and to develop the teaching of public health engineering and environmental sanitation at the Institute of Hygiene University of the Philippines. Dr A. Q. Y. T. M., of Hawaii, took up his duties as sanitary engineer in this project in January. Educated at the University of Hawaii and the Massachusetts Institute of Technology, Dr Tom joined WHO in 1955 as sanitary engineer with the WHO-assisted environmental sanitation project in Taiwan (China). He had previously worked as a civil engineer in the Division of Sewers, Honolulu, directing and developing pollution survey and research projects.

Leprosy control

A WHO-assisted leprosy control programme has been in operation in Thailand since October 1955. Control methods are demonstrated and local personnel are trained at a pilot project in Khon Kaen Province from which activities are being extended to other parts of the country.

Dr M. C. L. Smith, who was recently appointed to the staff of the programme, will see the Government of Thailand on the training of anti-leprosy workers and help to develop a school of leprosy control. Dr Smith was educated at London University and the London School of Hygiene and Tropical

Medicine. After working with the Ministry of Health for England and Wales and the British Red Cross Society, he served with the United Nations Korean Reconstruction Agency from 1952 to 1957 and subsequently with the Mission to Lepers in Korea and Hong Kong.

Malaria appointments in the Western Pacific Region

The malaria unit at the WHO Regional Office for the Western Pacific is being enlarged in order to meet commitments under the world-wide malaria eradication programme. One of the new staff members of the unit is Professor C. Y. Chow, who has been appointed as entomologist. Professor Chow has studied biology, parasitology, malaria control, and medical entomology in China, India, and the United States. He has been with WHO since 1951 working as entomologist at the Malaria and Insect Borne Disease Training Centre in Ceylon and as entomologist-malarologist in Surabaya, Indonesia.

Another new staff member of the malaria unit at the WHO Regional Office for the Western Pacific is Mr Pastor S. Echaz, who will serve as sanitary engineer. Mr Echaz obtained his diploma of civil engineering from the University of Kansas and his diploma in public health from the University of Michigan. He has worked as sanitary engineer with WHO-assisted antimalaria projects in El Salvador and Taiwan (China).

Mr John W. Armstrong, of the United Kingdom, recently took up his duties as sanitarian in the WHO-assisted malaria eradication project in North Borneo. Educated at the London School of Food Technology and the Rutherford Technical College, Newcastle-on-Tyne, England, Mr Armstrong worked as a sanitarian with the United Nations Korean Reconstruction Agency from 1951 to 1955. He has taken a WHO malaria training course in London and Iraq and comes to his present assignment from service on a WHO malaria advisory team.

Nursing education

A team of WHO nurse-educators from Singapore is helping the public health authorities with instruction in nursing administration, ward administration, and clinical teaching in public health nursing, midwifery and psychiatric nursing. It is hoped that this programme will eventually lead to the establishment of a department of nursing studies at the University of Malaya.

Miss Norma Wyle, the latest member of the WHO team, studied nursing at the Universities of Toronto and British Columbia, Canada. She is a former Supervisor of Service Training at the Vancouver General Hospital.

Training course on virus diseases

During the past ten years considerable advances have been made in the laboratory techniques employed in virology and spectacular results—notably the development of poliomyelitis vaccines—have been recorded.

A two week inter regional course on laboratory techniques for virus and rickettsial diseases was recently held at Coonoor India under WHO auspices. It was attended by laboratory technicians and virologists from Burma Ceylon Hong Kong India Indonesia Iran Iraq Japan the Philippines Sudan Taiwan (China) Thailand the United Arab Republic (Province of Egypt) and Viet Nam. The latest laboratory techniques used in virology were demonstrated and the public health importance of laboratory diagnosis of such diseases as poliomyelitis encephalitis exanthematous typhus etc was stressed.

The course was a particularly timely one since the incidence of poliomyelitis in several of the participating countries (e.g. Iraq Jordan Lebanon and the United Arab Republic) between July 1957 and June 1958 was substantially higher than in the previous twelve months. Another virus disease—encephalitis—has become a particular problem in India where it has reached epidemic proportions during the past five years.

Inter regional seminar on dental health

More than forty public health dentists from the Eastern Mediterranean Western Pacific and South East Asia Regions took part in a seminar held in Adelaide Australia from 10 to 20 February 1959 under the auspices of the WHO Regional Committee for the Western Pacific the Australian Department of Health and the Australian Dental Association.

The purpose of the seminar was to review recent developments in dental health and particularly in preventive dentistry to seek solutions for current dental health problems in the participating countries and to discuss standardization in the reporting of dental cases. Participants had the opportunity of attending the XVth Australian Dental Congress which was held the following week.

Contributions to Malaria Eradication Special Account

Three new contributions to the WHO Malaria Eradication Special Account have been announced since the beginning of 1959. The first was a sum of \$3 million from the United States Government this brings the total amount contributed to the fund by that country up to \$8 million. This was followed by a contribution of 100 000 Swiss francs (about \$23 250) from the Government of Switzerland and one of approximately \$31 500 from the Government of India.

The Malaria Eradication Special Account was set up in 1955 to receive voluntary contributions from governments and private sources for malaria research purposes and to provide equipment supplies and services for the eradication of the disease. Sixteen countries have now contributed to the fund to a total amount of approximately \$8 258 000. It is estimated that WHO will need to raise a total of some \$50 000 000 to meet its responsibilities in the world wide malaria eradication campaign over the next five years.¹

Soper Lectures in International Health

In honour of Dr Fred L. Soper who served as Director of the Pan American Sanitary Bureau (WHO Regional Office for the Americas) for twelve years prior to his retirement on 1 February 1959 the staff of the Bureau has established a series of Fred L. Soper Lectures in International Health. The series—five lectures in all—will be given by outstanding medical personalities in successive years at leading schools of public health in the United States Brazil Chile Mexico and Canada. The first lecture will be given this year by Dr Soper himself at the School of Hygiene Johns Hopkins University Baltimore Md. The lectures will be financed by voluntary donations from PASB staff members and the lecturers will be chosen by the host universities and a committee of PASB staff.

Review of WHO Publications

World Directory of Venereal Disease Treatment Centres at Ports Geneva 1959
162 pages Price 8/6 \$1.75 or Sw fr 5.—
Bilingual publication (English and French)

The World Health Organization has just published a new edition of the list of centres in ports throughout the world at which merchant seamen can obtain treatment for venereal disease. Three editions of this list were published in 1933, 1935 and 1939 respectively by the Office International d'Hygiène Publique and a fourth by the World Health Organization in 1951. The list is published in application of the provisions of the Brussels Agreement of 1924 which was originally signed by 13 States and to which 67 countries and territories are now parties. Countries which are signatories to the Agreement undertake to provide merchant seamen and watermen suffering from venereal diseases with the necessary medical treatment and supplies free of charge and without distinction of nationality the same applies to hospital treatment when it is considered necessary. A certain number of other coun-

tries not parties to the Agreement also make available all or part of the facilities provided under it either free of charge or against partial or full payment by the shipping company, the shipping agent or the seaman himself.¹

This directory is intended principally for the use of masters of merchant vessels, owners of river craft and port health services. It contains an alphabetical list by country and by port of the existing treatment centres with the following information for each: name and address, consultation days and hours, type of service provided, availability of hospital facilities, and whether treatment is free or not. The text of the Brussels Agreement is also given together with a list of the countries which have adhered to it or which unofficially apply its provisions and a facsimile of the personal treatment booklet which is delivered to each seaman and in which is entered all information on diagnosis and treatment.

— *Ann. Inst. Hyg. Publ. Serv. N. 37* (1958) p. 111

Bilharziasis

This excellent monograph is the first comprehensive study concerned with the species identification of snails belonging to the genera *Biomphalaria* and *Bithynia* that serve as intermediate hosts in the spread of bilharziasis in Africa. In attempting to classify the various species of these genera 5500 specimens from 794 different populations were studied.

Experts in the field of malacology should welcome this attempt by the author to classify the various species of these genera. This excellent study should serve as a basis for more advanced work relating to these snails of medical importance in Africa.

Ti. Amer. J. Trop. Med. Hyg.
December 1958

¹ *Med. Ann. Inst. Hyg. Publ. Serv. N. 37* (1958) p. 111. Price £1—\$4.00 S. f. 12.—

Public health nurse for Viet Nam

For the past four years a WHO team has been helping to develop maternal and child health services in Viet Nam. This team has now been joined by a public health nurse Miss Sarah Sainte Marie of Canada. After graduating from Notre Dame School of Nursing Montreal Miss Sainte Marie obtained her certificate in public health nursing at the University of Montreal. Before joining WHO she served with the Victorian Order of Nurses for Canada in New Brunswick Montreal Winnipeg and Vancouver she has also worked as head nurse in the paediatric unit of Notre Dame Hospital Montreal.

Appointments in the Eastern Mediterranean Region

Dr Abdel Rahman Zahar of the United Arab Republic has been assigned to the Malaria Eradication Training Centre in Cairo which serves the whole of the Eastern Mediterranean Region. A graduate of Cairo University Dr Zahar subsequently studied entomology at Edinburgh University and has served as Senior Entomologist and Head of the Fly Control Branch at the Ministry of Public Health Cairo. Since 1952 he has been on the staff of the WHO assisted malaria control project in Saudi Arabia.

A WHO assisted project aiming at the eradication of malaria from Iraq within five years was started in 1957 as an extension of an earlier control programme. Dr S. S. Parameswaran of India has joined the staff of this project as malariologist. A graduate of Madras Medical College Dr Parameswaran was house surgeon at Stanley Hospital Madras before taking up his appointment with WHO.

A WHO physiotherapist—Miss Gladys H. Johnson of Great Britain—has just been assigned to the Karachi School of Physiotherapy Pakistan. Miss Johnson who comes to this assignment from a WHO project for the rehabilitation of handicapped children in Lebanon was educated at St Mary's Hospital and the Morris School of Physiotherapy London.

The second phase of a WHO assisted BCG vaccination campaign started in the Sudan in October 1956. Miss Cecile Hubert of France has been appointed as nurse with the team working on this project. Miss Hubert who is the holder of a diploma of social medicine from the University of Caen has already worked in WHO assisted BCG vaccination campaigns in Iraq Libya and Pakistan.

Miss Sirkka Leva of Finland has been appointed nurse-educator with a WHO assisted project in Teheran Iran. After attending the University the School of Nursing and the College of Nursing in Helsinki Miss Leva took post graduate nursing and teaching courses in London and the United States. She has held a number of responsible posts in paediatric nursing in Finland.

Changes at WHO Headquarters

The World Health Organization has recently lost the services of Dr Harry Sutherland Gear Assistant Director General in charge of Central Technical Services between 1951 and 1957 then Director Consultant on the WHO Headquarters staff. He returns to the country of his birth South Africa, to take up a position with the South African Council of Scientific and Industrial Research. Dr Gear was born in 1903 and educated at the University of the Witwatersrand Johannesburg and at the London School of Hygiene and Tropical Medicine. Before joining WHO in 1951 he had served as medical officer in Northern Rhodesia. Head of the Department of Preventive Medicine, Lester Institute of Medical Research Shanghai and Deputy Chief Health Officer in South Africa. In 1946 he represented the South African Government at the International Health Conference in New York and was also the South African delegate at the first four World Health Assemblies. He was a member of the WHO Executive Board from 1948 to 1951 and was elected its Chairman in 1950.

As announced in the Chronicle for January a Cardiovascular Diseases unit has been established in the Division of Organization of Public Health Services at WHO Headquarters. Dr Z. Fejfar from the Institute for Cardiovascular Research Prague Czechoslovakia has been appointed Chief Medical Officer to the new unit which has the following tasks: to collect and disseminate scientific information on cardiovascular diseases; to stimulate and co-ordinate applied research on control measures for these diseases; to stimulate the adoption of standards and uniform nomenclature for their pathological and clinical diagnosis; to promote co-ordinate and where necessary undertake epidemiological studies in this field; and to act as the secretariat for the Expert Advisory Panel on Chronic Degenerative Diseases.

Dr Paul Taillard of France has been appointed Medical Officer to the Radiation and Isotopes unit at WHO Headquarters. Dr Taillard worked for twenty years as a cancerologist in France Cambodia Viet Nam and China (Shanghai) before joining WHO in 1955. His first assignment with the Organization was with the cancer control project in Iran.

Dr John Burton of Great Britain has been appointed to the staff of the Health Education of the Public unit at WHO Headquarters. For the past ten years Dr Burton has been Medical Director of the Central Council for Health Education in London and during the past six months he has served as consultant for the European Office of WHO on assignments in Spain Italy Finland Yugoslavia the Netherlands and Sweden. He has also served on the WHO Expert Committee on Health Education.

bromphen ram num	(3 <i>p</i> -bromophenyl 3-pyridylpropyl)dimethylammonium
bromphenuramine	
broparoeestrolum	1-bromo-2- <i>p</i> -ethylphenyl 1,2-diphenylethane
boparoeestrol	
buphen num	1-(<i>p</i> -hydroxyphenyl)-2-(1-methyl-3-phenylpropylammonium)propanol
buph nine	
buthal talum natricum	a mixture of 100 parts by weight of the monosodium derivative of 5-allyl 5-ethyl 2-thiobarbituric acid and 6 parts by weight of excess sodium carbonate
buthal tal odum	butylidimethyl(2,3-dimethyl 5-oxo-1-phenyl 3-pyrazol-4-yl)ammonium iodide
butopyrammonum od d m	
butopyrammonium od d	4,4-bis-(5-dihydrochaulmoogroylamido)phenylsulfone
haulmosulfonum	
chaulmos ifone	
chlorazanium	2-amino-4- <i>p</i> -chloroanilino- <i>s</i> -triazine
chlorazani	
chlo benzo amunum	1-(2- <i>o</i> -chlorodiphenylmethoxyethyl)-4- <i>o</i> -methylbenzylperazine
chlorbenzotamune	
chlormezanonum	2-(4-chlorophenyl)-3-methyl-4-metathiazanone 1,1-dioxide
chlormezanone	
chloroth az dum	6-chloro-7-sulfamoylbenzo-1,2,4-(<i>HF</i>)-thiadiazole 1,1-dioxide
chloroth az de	
chlorphenes num	3- <i>p</i> -chlorophenoxypropane 1,2-diol
chlorphenes n	
chlorphenocet amsonas	2,4-dichlorophenoxydimethyl <i>N</i> -octylammonium ammoniate (amsonic acid is 4,4-diaminostilbene 2,2-disulfonic acid)
chlorphenocet um amso t	<i>N</i> -3,4-dihydroxy- <i>N</i> -isopropylguanidine
chlorp oguanilum	
chlorp oguanil	3-(<i>p</i> -chlorophenyl)sulfonyl <i>p</i> -opylurea
chlorpropam d m	
chlorpropam d	
chlorzoxazonum	5-chloro-2-benzoxazolone
chlorzo z one	
chol ni theophyll nas	choline salt of theophylline
choline theophyll t	
clemizolum	1- <i>p</i> -chlorobenzyl 2-pyridinol 1-ylmethylbenzimidazole
clemzole	
clemizolum pe scill m	benzylphenethyl combined with 1- <i>p</i> -chlorobenzyl 2-pyridinol 1-ylmethylbenzimidazole
clemzole pe scilli	
cyclandelatum	3,5,5-trimethyl 1-hexyl mandelate
cyclandelate	
cycl benzap an m	5-(3-dimethylammonopropyl)ene)benzo(<i>e</i>)cycloheptatriene
cyclobenzaprine	
cyclopregnolum	6β-hydroxy 3,5- <i>cis</i> -isopregnan-2-one
cyclopregnol	
dequal chloridum	decamethyl nebul(4-aminoquinidine)chloride)
dequal n m chloride	
dexam thasonum	9α-fluoro-16α-methylprednisolone
dexamethas ne	

International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 3 of the Procedure for the Selection of Recommended International Non Proprietary Names for Pharmaceutical Preparations¹ notice is hereby given that the following names are under consideration by the World Health Organization as proposed international non proprietary names

Comments on or formal objections to the proposed names may be forwarded by any

person to the Secretary Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations World Health Organization within four months from 1 April 1959

The inclusion of a name in the lists of proposed international non proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

PROPOSED INTERNATIONAL NON PROPRIETARY NAMES (Prop INN) LIST 8²

Proposed Latin Name
Non Proprietary Name
(Latin English)

Chemical Name

acetyldigitoxinum	acetyldigitoxin	
acetyldigitoxin		
acidum trethocanicum	3 hydroxy 3 7 11 trimethyldodecanoic acid	
trethocanic acid		
alimemazinum	10 (2 methyl 3 dimethylaminopropyl)phenothiazine	
alimemazine		
amanozinum	2 amino-4-anilino s triazine	
amanozine		
ambazonum	1 4 benzoquinone amidinohydrazone thiosemicarbazone hydrate	
ambazone		
aminopromazinum	10-(2 3 bisdimethylaminopropyl) phenothiazine	
aminopromazine		
aminoxyltriphenum	3 dimethylamino 1 1 2 tris (4 methoxyphenyl) 1 propene	
aminoxyltriphene		
amopyroquinum	7-chloro-4-(4-hydroxy 3 pyrrolidin 1 ylmethylamino)quinoline	
amopyroquin		
beclamidum	N benzyl β-chloropropionamide	
beclamide		
benzmalacenum	N (2 3-di p-chlorophenyl 1 methylpropyl)maleamic acid (form)	
benzmalaccene		
bialamicolum	3 3 diallyl 5 5 bisdiethylaminomethyl-4 4 -dihydroxydiphenyl	
bialamicol		

¹ See Annex 1 page 157
² Oth 1st of p po ed int t 1 non-p op et ry am c be f d l Ch 11 1953 7 97 1954 8 16 313 1956,
10 28 1957 11 231 1958 12 10 1959 13 105

isopropam di iod dum

isopropam de od de

isoxsuprinum

so s pr ne

khellos dum

khellos de

le omepromaz m

le omepromazine

lyserg dum

lyserg d

mannomust num

manjomust ne

melp lanum

m lphala

methocarbamol

m thoca b mol

meth h x talum

meth hex tal

methyldn lon m

m thylpredn lone

monophosphoth m um

monophosphoth am

orph ad m

orph nad e

o dmed n m

o ad m d ne

x am dum

o am de

yb p oca um

yb proca ne

oxyphenb tazo um

oxyphenbutazone

oxyphenb isat um

oxyphenb isat e

paracetam l m

paracetam l

p id x a m

parid x a m

pas az d m

pas na d

pecaz m

pecaz ne

pemp d n m

pmp d e

perph naz num

perphen ine

(3-ca bamoyl 3 3 d phenylpropyl)d p opylmethyllumon m od de

1-(p-hydro yphenyl) 2 (1 methyl 2 phenoxyethylamino)-1 p opanol

2 hyd ymethyl 5 meth y furanochrom e gl cos de

() 10-(3-d m thylam o-2 methylpropyl)-2 methoxyph oth azine

lyserg acid d thylamide

1 6-d -(2-chloroethylam o)-1 6-d deoxy D-ma n tol

p-d (2-chlo oethyl)amino-x phe ylalan ne

(2 hyd y 3-o-metho yphenoxyp ylyka bamate

-(=)-5 thyl 1 methyl 5-(1 methyl 2 p ntynyl)ba b turic ae d

6-methylpr d isolone

monophosphor ester of th am ne

4 4-d methyl 2-(-o-tolylbenzyl o)ethylam ne

4-(2 benzoazoly)-4 benzyl 4 4 -dimethylethyle ed amine

2-ethyl 3 propylgly dam de

2-d ethylam oethyl 4-am o-3-b toxyben oat

1-(p-hyd oxyphenyl)- ph yl-4-b tyl 3 5 pyrazol d ned on

3 3 b s(4-hydro yph nyl) ndole

p-acetam dophenol(acetam nophen)

1 m thylp pe d-4-yl p-b tylaminobenzoate

is n c t nylhydraz de p-am nosalcylat

10-(1 methyl p perid 3 ylmethylphenoth azine

1,2- 6 6-pentamethylp perid n

2-chlo o-10-13 [4-(2 hyd o yethyl)p peraz n-1 yl|propyl]phenothiaz ne

diathymosulfonum	di[4 (4-hydroxy 2 methyl 5 isopropylphenylazo)phenyl]sulfon
diathymosulfone	
dichlormezanonium	2 (3 4-dichlorophenyl) 3 methyl-4-metathiazanone 1 1-dioxide
dichlormezanone	
dihydrocodeinum	
dihydrocodeine	
diloxanidum	N dichloroacetyl p hydroxy N methylaniline
diloxanide	
dimethazanum	1 3 dimethyl 7 (2 dimethylaminoethyl)xanthine
dimethazan	
dimethisteronium	6a 21 dimethylethisterone
dimethisterone	
diphoxazidum	N acetyl N (β hydroxy β β diphenylpropionyl)hydrazine
diphoxazide	
dithiazanini iodidum	3 ethyl 2 [5 (3-ethyl 2 benzothiazolidinylidene) 1 3 pentadienyl] benzothiazolium iodide
dithiazanine iodide	
fluorometholonum	9 fluoro 11β 17 dihydroxy 6a methyl 1 4 pregnadiene 3 20 dione
fluorometholone	
furmethonolum	5 morpholinomethyl 3 (5 nitrofurfurylideneamino) 2 oxazolidinone
furmethanol	
furmethoxadonum	5 methyl 3 (5 nitrofurfurylideneamino) 7 oxazolidinone
furmethoxadone	
glybuthiazolum	2 p aminobenzenesulfonamido-5 tert butyl 1 3 4 thiadiazole
glybuthiazol	
glyprothiazolum	2 p aminobenzenesulfonamido 5 isopropyl 1 3 4 thiadiazole
glyprothiazol	
hedaquinii chloridum	hexadecamethylenebis (2 isoquinolinium)dichloride
hedaquinium chloride	
hexadimethrini bromidum	N N N N tetramethylhexamethylenediamine trimethylene bromid polymer
hexadimethrine bromide	
hydroxindasolum	5 hydroxy 1 (p methoxybenzyl) 2 methyltryptamine
hydroxindasol	
hydroxychloroquinum	7-chloro-4 [4-(N-ethyl N 2 hydroxyethylamino) 1 methylbutylamino] quinoline
hydroxychloroquine	
hydroxydioni natrii succinas	sodium 21 (3-carboxypropionyloxy)pregnane 3 20 dione
hydroxydione sodium succinate	
hydroxymycinum	an antibiotic substance obtained from cultures of <i>Streptomyces parvulus</i> or the same substance produced by any other means
hydroxymycin	17 acetoxypregn-4-ene 3 20 dione
hydroxyprogesteroni acetas	
hydroxyprogesterone acetate	17a hexanoyloxypregn-4-ene 3 20-dione
hydroxyprogesteroni caproas	
hydroxyprogesterone caproate	
imipraminum	5-(3-dimethylaminopropyl) 10 11 dihydro-5H dibenz[b f] azepine
imipramine	
inproquonum	2 5 bisethylenemino-3 6-dipropoxy 1 4 benzoquinone
inproquone	

triacetin	glyceryl triacetate
triacetyloleandomycinum	the triacetyl ester of oleandomycin, an antibiotic substance obtained from cultures of <i>Streptomyces antibioticus</i> or the same substance produced by any other means
triacetyloleandomycin	
triamcinololum	9-fluoro-16 α -hydroxyprednisolone
triamcinolone	
trimethidinum methylsulfas	(+)-3-(3-dimethylaminopropyl)-1,8,8-trimethyl-3-azabicyclo[3,2,1]octane-2-dimethylmethanesulfate
trimethidinium methylsulfate	
tropglinum	tiglyltropine
tropglin	
xylometazolinum	2-(4-tert-butyl-2,6-dimethylbenzyl)imidazoline
xylometazoline	

Annex 1

PROCEDURE FOR THE SELECTION OF RECOMMENDED INTERNATIONAL NON-PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

The following procedure shall be followed by the World Health Organization in the selection of recommended international non-proprietary names for pharmaceutical preparations in accordance with the World Health Assembly resolution WHA3.11.

- Proposals for recommended international non-proprietary names shall be submitted to the World Health Organization on the form provided thereto.
- Such proposals shall be submitted by the Director-General of the World Health Organization to the members of the Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations designated for this purpose for consideration in accordance with the General principles for guidance in devising International Non-proprietary Names appended to this procedure. The name used by the person discovering or first development and marketing a pharmaceutical preparation shall be accepted, unless there are compelling reasons to the contrary.
- Subsequent to the examination provided for in article 2, the Director-General of the World Health Organization shall give notice that a proposed international non-proprietary name is being considered.

A. Such notice shall be given by publication in the *Chronicle of the World Health Organization* and by letter to Member States and to national pharmacopoeia commissions or other bodies designated by Member States.

() Notice may also be sent to specific persons known to be concerned with a name under consideration.

phenactropini chloridum	N phenacylhomatropinium chloride
phenactropinium chloride	
pheniraminum	dimethyl(3 phenyl 3 pyrid 2 ylpropyl)amine
pheniramine	
phenyracillinum	2 5 diphenylpiperazine di(benzylpenicillin)
phenyracillin	
piprinhydrinatum	4 diphenylmethoxy 1 methylpiperidine salt of 8-chlorotheophylline
piprinhydrinate	
poloxalkolum	polymer of ethylene oxide propylene oxide and propylene glycol
poloxalkol	
polybenzarsolum	a mixture of polymers formed from the reaction of formaldehyde and
polybenzarsol	4-hydroxybenzenearsonic acid
poskinum	propionyltyrosine
poskine	
propiomazinum	10-(2 dimethylamino-1 methylethyl) 2 propionylphenothiazine
propiomazine	
protamini sulfas	sulfate of the strongly basic protein protamine
protamine sulfate	
pyrazinamidum	pyrazine 2-carboxamide
pyrazinamide	
renanolonum	3 hydroxypregnane 11 20 dione
renanolone	
ristocetinum	an antibiotic substance obtained from cultures of <i>Nocardia lurida</i> et
ristocetin	the same substance produced by any other means
salinazidum	N isonicotinoyl N salicylidenehydrazine
salinazid	
sulfaethidolum	N ¹ (5-ethyl 1 3 4-thiadiazol 2 yl)sulfanilamide
sulfaethidole	
sulfamethoxypyridazinum	6-methoxy 3 sulphanilamidopyridazine
sulfamethoxypyridazine	
sulfinpyrazonum	1 2 diphenyl-4 (2 phenylsulfinyloethyl) 3 5 pyrazolidinedione
sulfinpyrazone	
sulocarbilatam	2 hydroxyethyl p-sulfamylcarbanilate
sulocarbilate	
tacrinum	9 amino 1 2 3 4 tetrahydroacridine
tactine	
thalidomidum	a phthalimideglutaramide
thalidomide	
thiambutosinum	1 (p butoxyphenyl) 3 (p-dimethylaminophenyl)thiourea
thiambutosine	
thiocolchicosidum	2 14 di(demethoxy) 2 glucosidoxo 14 methylthiocolchicine
thiocolchicoside	
thiopropazatum	10-[3 {4-(2 acetoxyethyl)piperazin 1 yl}propyl] 2-chlorophenothiazine
thiopropazate	
thioridazinum	10-[2 (1 methylpiperid 2 yl)ethyl] 2 methylthiophenothiazine
thioridazine	

GENERAL PRINCIPLES FOR GUIDANCE IN DEVISING INTERNATIONAL NON PROPRIETARY NAMES

- Names should preferably be free from any anatomical, physiological, pathological or therapeutic suggestion.
- An attempt should first be made to form a name by the combination of syllables in such a way as to indicate the significant chemical groupings of the compound and/or its pharmacological classification. Preference should be given to the following syllables:

Latin	English	French	
-ium	-ine	-in	for alkaloids and organic bases
-olum	-ol	-ol	for alcohols and phenols (-OH group)
-al	-al	-al	for aldehydes
-onum	-one	-one	for ketones and other substances containing the CO group
-um	-ene	-ène	for unsaturated hydrocarbons
-anum	-ane	-a	for saturated hydrocarbons
-cainum	-cain	-caine	for local anaesthetics of the procaine type
-mer	-mer	-me	for mercurial compounds
-sulfonum	-sulfo	-sulfone	for sulfone derivatives
-quinum	-quin	-quine	for antimalarial substances containing a quinoline group
-um	-cric	-cine	for antimalarial substances containing an acridine group
-sulfam	-sulfa	-sulfam	for derivatives of sulfanilamide having an antibacterial action
-dionum	-dione	-dion	for anti-epileptics derived from oxazolinedione
-tonum	-to	-tine	for anti-epileptics derived from hydantoin
-erginum	-ergin	-ergine	for atcholinesterases of the physostigmine (eserine) type

3. Names should be distinct enough to avoid ambiguity. They should not be unnecessarily long and should not be liable to confusion with names already in use.

4. The addition of a terminal capital letter or number should be avoided as far as possible.

5. Names proposed by the person discovering or first developing and marketing a pharmaceutical preparation or already officially adopted in any country or used in national pharmacopoeias, or in works of reference such as New and Non-official Drugs should receive preferential consideration.

6. Congruence should be taken of the names of closely related substances and where desirable the name should show the relationship.

These principles replace those published in *Chronicle* 1958 12, 111.

- B Such notice shall
- (i) set forth the name under consideration
 - (ii) identify the person who submitted a proposal for naming the substance if so requested by such person
 - (iii) identify the substance for which a name is being considered
 - (iv) set forth the time within which comments and objections will be received and the person and place to whom they should be directed
 - (v) state the authority under which the World Health Organization is acting and refer to these rules of procedure
- C In forwarding the notice the Director General of the World Health Organization shall request that Member States take such steps as are necessary to prevent the acquisition of proprietary rights in the proposed name during the period it is under consideration by the World Health Organization
- 4 Comments on the proposed name may be forwarded by any person to the World Health Organization within four months of the date of publication under article 3 of the name in the *Chronicle of the World Health Organization*
- 5 A formal objection to a proposed name may be filed by any interested person within four months of the date of publication under article 3 of the name in the *Chronicle of the World Health Organization*
- A Such objection shall
- (i) identify the person objecting
 - (ii) state his interest in the name
 - (iii) set forth the reasons for his objection to the name proposed
- 6 Where there is a formal objection under article 5 the World Health Organization may either reconsider the proposed name or use its good offices to attempt to obtain withdrawal of the objection Without prejudice to the consideration by the World Health Organization of a substitute name or names a name shall not be selected by the World Health Organization as a recommended international non proprietary name while there exists a formal objection thereto filed under article 5 which has not been withdrawn
- 7 Where no objection has been filed under article 5 or all objections previously filed have been withdrawn the Director General of the World Health Organization shall give notice in accordance with subsection A of article 3 that the name has been selected by the World Health Organization as a recommended international non proprietary name
- 8 In forwarding a recommended international non proprietary name to Member States under article 7 the Director General of the World Health Organization shall
- A request that it be recognized as the non proprietary name for the substance and
 - B request that Member States take such steps as are necessary to prevent the acquisition of proprietary rights in the name including prohibiting registration of the name as a trademark or trade name

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WORLD HEALTH ORGANIZATION

BULLETIN

DE
L'ORGANISATION MONDIALE DE LA SANTÉ

OF
THE WORLD HEALTH ORGANIZATION

- Evaluation of the health hazards involved in house spraying with DDT—*Homer R Wolfe Kenneth C Wolker Joseph W Elliott & William F Durham*
- Exposure of spray men to dieldrin in residual spraying—*T E Fletcher J M Press & D Bagster Wilson*
- Pyrimethamine resistance in *Plasmodium vivax* malaria—*Martin D Young & Robert W Burgess*
- The development of pyrimethamine resistance by *Plasmodium falciparum*—*Robert W Burgess & Martin D Young*
- Morphology and development of the salivary glands and their chromosomes in the larvae of *Anopheles stephensi* ss—*N Rislukesh*
- Studies on insecticide resistant anophelines 2 Chromosome arrangements in laboratory developed DDT resistant strains of *Anopheles atroparvus*—*E Mosna C Palmieri A R S Ascher L Rivoecchi & I Neri*
- The susceptibility and resistance of *Bulinus (Physopsis) globosus* and *Bulinus (Bulinus) truncatus rohlfsi* to two strains of *Schistosoma haematobium* in Ghana—*Fergus S McCullough*
- The fox as a definitive host of *Echinococcus* and its role in the spread of hydatid disease—*M A Gemmell*
- Some general remarks and new observations on psittacosis and ornithosis—*A F Meyer*
- Improvement of the antigenicity of antirabies vaccine by pooling checked by post-challenge vaccination of guinea pigs—*A Veeroroghavan*
- A survey of oral health Qalyub Project Egypt—*M G Wheatcroft & C R Klunt*

Notes

Bibliographical Section

Typhus and related infections

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LESSONS OF THE 1957-1958 INFLUENZA PANDEMIC

The 1957-1958 influenza pandemic followed these lines: by the action of various national health services throughout the world, it was a public health crisis which aroused a widespread feeling of the seriousness of the 1918 influenza pandemic but it was a realisation that the pandemic gave a new cell to opposition to the further development of the world of epidemic of the disease. Through the world of epidemic of the disease, it was a serious and its relationship with national health institutions. WHO was in a unique position to collect and analyse the results of epidemiological, clinical, serological and immunological studies carried out in various parts of the world. A call to the establishment of a European centre as well as in Japan and Far East. The article has just appeared in the Bulletin of the World Health Organization.¹ The article that follows is based on this article and deals with certain findings that the light on the behaviour of the disease and also with the role of the national primary

One way in which the influenza pandemic of 1957-1958 differed from that of 1918 was that almost all the countries it attacked had co-ordinated epidemiological services and health statistics services for recording cases. A good number of these countries had moreover virological institutes working in liaison with reference centres such as the World Influenza Centre, London and the International Influenza Center for the Americas, Montgomery, Ala., both established under the auspices of WHO.

The pandemic probably started in China at the beginning of the spring of 1957 and spread for several weeks without being notified to epidemiological stations since the WHO epidemiological information services do not cover continental China. Its arrival in Singapore notified on 4 May served as a warning to health services all over the world. Its progress was noted, tracked down and sometimes forecast so that preparations for its arrival could be made in advance. Viruses were isolated in national laboratories and identified on the spot or sent to the World Influenza Centre for accurate typing. The antigenicity of the

strains was studied, vaccines were prepared, population groups were vaccinated with different types of vaccine and the effectiveness of the latter was evaluated by various methods. For a long time certain domestic animals had been suspected of acting as reservoirs of influenza virus. In 1957-1958 veterinary services were asked by WHO to look for antibodies and viruses in pigs and horses for it is possible that a domestic animal probably in Eastern Asia harbours the virus which since the eighteenth century has spread over the world several times in vast pandemics.

Epidemiology

In an age when the spread of infection is greatly facilitated by extensive intercontinental travel and speedy transport it is difficult to chart from country to country the advance of a disease such as influenza whose symptoms though mild may be confused with those of other complaints.

From its initial Asiatic foci the influenza pandemic spread like wildfire and it was hopeless to try to stop it by the usual epidemic control methods. For example despite a five-day quarantine imposed on the SS *Rapala* lying off Madras with 44 active

¹ Bull. Wld Hlth Org 1957, 20: 183-208. For details of the number of cases, see the editorial section. The end of the number of the Chinese.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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between the mortality figures for the 1918 and the 1957 pandemics in the Province of Assam for example 9 fatal cases were recorded in 1957 as against 111 340 in 1918 and in Bombay 315 deaths in 1957 as against 1 059 497 in 1918

Clinical features

It is clear—as the above figures indicate—that the pandemic was mild. In India where the morbidity was estimated at 12 000 per million inhabitants only 242 deaths were recorded per million cases. However Menon points out that this apparently harmless pandemic was characterized in India by a number of cases with nervous symptoms.

Zhdanov also mentions “that the clinical picture caused by A2 virus in children is characterized by an intoxication of the nervous system having a serious effect on the general state of health with a high temperature vomiting and frequent liquid stools.” In a few cases “he added an encephalitic syndrome was observed accompanied by clonic and tonic cramps delirium and even loss of consciousness.” According to the same author pneumonia was the cause of 95 of deaths among children and adults. This was not a pneumonia due to a secondary streptococcal staphylococcal or pneumococcal infection as in previous years but an influenzal haemorrhagic pneumonia. In addition signs of influenzal toxicosis—acute cerebral oedema and haemorrhagic foci in the internal organs—were noted.

Virology

It is known that the 1957 influenza epidemic was due to a so-called “Asian virus” designated A2 differing in its biological and antigenic properties from those which had caused previous epidemics. While having certain antigens in common with the A and A1 viruses as was shown by the complement fixation test it differed from them in its haemagglutinating antigenic components. The virus gave very low haemagglutination titres with poultry and guinea pig red cells. Ether treatment which decreases the haemagglutination titre of most of the A1 viruses

with the red cells of poultry and guinea pigs actually increased this titre in the case of certain A2 virus strains. Unlike any previously known human influenza virus the A2 virus agglutinated the red cells of the horse calf and pig resembling in this respect several viruses isolated from animals (A equi virus isolated from the horse in Czechoslovakia the virus of avian plague and that of duck influenza).

Several authors have reported differences in the serological behaviour of the various strains within the A2 group. Zhdanov & Ritova found among 42 viruses isolated during the epidemic in the USSR “avid” strains which react not only with homologous sera but also with all A group sera and “non avid” strains which react only with A2 sera. The haemagglutination of the avid strains is inhibited by sera from convalescents and vaccinated animals that of the non avid strains is not inhibited by these sera or only to a very small extent. The complement fixation test does not show any difference between avid and non avid strains. It was thought at first that these two serological forms might represent two consecutive stages in the development of the A2 virus the first form having retained a certain affinity for the older strains but losing it in the course of the epidemic. Experience however did not bear this out. Avid and non avid strains were isolated at all stages of the pandemic often at the same time in the same place and from the same human group. The strains retained their characteristics during numerous sub-cultures it was only after twenty mouse passages that a transformation of avid strains into non avid strains was noted.

In strains isolated in Japan Fukumi found P phase viruses which were readily inhibited by convalescent serum while others in the Q phase were scarcely inhibited by it. The first had very satisfactory immunizing properties but the second were hardly suitable for the preparation of an effective vaccine.

Vaccination

The ease with which the influenza pandemic spread has been explained by the inability

influenza cases and about 250 convalescents on board the disease spread to the State of Madras and the neighbouring provinces once the ship's 1600 passengers had disembarked. Even if the quarantine measures taken at Madras had been successful they would not have prevented the spread of influenza to India since in the same week other cases were reported at Calcutta and Bombay which were probably due to infection by travellers arriving by sea or air. In six weeks influenza had invaded the whole of India.

What was the origin of the cases reported in the last three weeks of May at Tashkent, Stalinabad, Omsk and Novosibirsk? Travellers coming from Japan, China, Hong Kong or Singapore? It is impossible to say with certainty. From Syria and Iran the disease entered Turkey which has extensive traffic and trade links with these adjacent countries. From the USSR the pandemic spread to Czechoslovakia and the first cases in Poland appeared in small foci at the Czechoslovak frontier.

In the USSR and in Japan the epidemic occurred in two successive waves: in the USSR in May, June and then in October; in Japan in June and then in November-December. Since influenza is not a summer disease it probably remained dormant after the initial outbreak until the first cold days of autumn and the beginning of the school year.

Almost everywhere morbidity was particularly high in groups of young adults and children in schools, camps and factories, sometimes reaching 40-60%. In Poland—a surprising and still unexplained fact—the morbidity figures were higher in the industrial than in the mining areas, where the recorded incidence was roughly the same as in the agricultural regions.

Several authors have discussed the functioning and reliability of the reporting systems used during the pandemic. These authors cite data showing that even under the most favourable conditions the number of influenza cases reported still fell short of the real figure. For example, the notification system at Łódź (Poland), a textile industry

centre, is considered a model one. It is based on daily telephone reports received by the municipal public health laboratory from all institutions connected with the public health service—factory clinics, outpatient departments, child clinics—and from private practitioners. However, this careful and thorough organization revealed only part of the real morbidity, as was shown by household surveys carried out in several districts of the town. Mild cases, particularly among children and unemployed adults, tended to escape notification.

Zhdanov mentions that according to door-to-door morbidity surveys among large population groups in certain towns of the USSR, the actual number of cases exceeded the figures registered by medical establishments by 16.50% (average 31%). It is believed that in the USSR the epidemic probably affected 30% of the whole population.

In Japan a questionnaire was distributed among the staff of the health services and their families so as to determine the morbidity rate in this population group. When the replies—based on clinical symptoms—were checked several weeks later by means of serological tests, 40% of cases diagnosed as influenza were found to be serologically negative and according to Fukumi the haemagglutination-inhibition (HI) test seemed to indicate that they were not influenza cases at all.

Although approximate, the notified figures are nevertheless instructive. In India it is estimated that the morbidity varied according to the region from 4000 to 28 000 per million inhabitants; the latter figure referred to Bombay. Variations in the case-fatality rate bring out differences in the behaviour of the disease in different parts of the country—thus, for example, there were areas with high case-fatality rates next door to areas where the corresponding rates were low. In West Bengal, which contains 7.2% of the population of India, notified cases accounted for only 6.4% of the total morbidity in the country, but the number of deaths represented 40.5% of the total mortality. In the instructive tables appearing in the study by Menon, there is a striking comparison

Q phase—on in the extreme stage of that phase—and that they had only feeble immunizing power but multiplied very well in the egg. The other was in the P phase and although developing more slowly in the egg had a high haemagglutinating power and was clearly inhibited by convalescent serum. Vaccine prepared with this strain gave better results than the others. Administration of two doses instead of a single dose appears to have been more effective.

The two consecutive waves of influenza in Japan made it possible to assess the effects of vaccination carried out at the end of the first wave and to evaluate the haemagglutination-inhibiting antibody titre serving as an indication of resistance to reinfection. The antibody levels of 18 confirmed cases of reinfection were mostly 1/16 or 1/32—and in a few cases 1/64—before reinfection. In another group of 14 patients believed to have been reinfecting acute serum titres of 1/128 or even 1/256 do not appear to have had a preventive effect. Generally speaking however it may be safe to say that those who have haemagglutination-inhibiting antibody levels of more than 1/64 are very largely protected from reinfection.

Poland

In this country vaccination has been carried out during each annual epidemic since 1953. In their article Przesmycki et al. describe the results obtained until the beginning of 1957 i.e. during virus A1 or B epidemics. The Polish vaccine differs from those used in most countries in that it is polyvalent and is administered intranasally. Several virus strains generally five belonging to groups A1 and B enter into the composition of the vaccine. Thanks to this variety there is a good chance of the vaccine's containing at least some antigens in common with the viruses responsible for an epidemic. The formalinized and adsorbed vaccine is administered intranasally reducing the number of secondary reactions to a minimum. Serological examination does not indicate any parallelism between the antigenic potency and protective potency of the vaccine. It is

possible that the response to intranasal instillation is partly a local immunity phenomenon which is not accompanied by an increase in the serum antibody level.

Sweden

Preparation of the vaccine began in May 1957 with an A2/Singapore/57 strain received from the World Influenza Centre at a time when the pandemic had not yet reached Sweden. Plans were drawn up with the aim of elucidating various points such as the size of the minimum effective dose, the relationship between the antibody response and the protective effect of the vaccine, the respective advantages of a single dose and of two doses and those of the aqueous vaccine and of vaccine adsorbed on aluminium phosphate. The first vaccinations of soldiers and civilians were carried out in August before the arrival of the epidemic. Serological analysis before and after vaccination showed that the titre of sera without antibody was always less than 1/22 and that anything above this level indicated a response to vaccination.

The vaccine was injected in doses of as much as 1500 haemagglutinating units (HU) (10–40 of these units = 1 CCA unit). A second injection had an evident booster effect and it may be concluded that two doses of vaccine slightly above 1500 HU injected at an interval of two weeks ensure an antibody response in almost all those vaccinated. In this series of tests also there was no parallelism between the level of the serological response and the degree of protection given. A weak HI response does not necessarily mean a poor protective effect and vice versa. The antibody response and the protective effect are variables depending on different factors (intensity and duration of contact, possible variation in the virulence of the virus, time elapsing between vaccination and exposure). It is thus difficult to speak of the minimum effective dose of an influenza vaccine since there is certainly more than one criterion of effectiveness. The authors of the article on vaccination in Sweden believe that it is not always suitable

of the antibodies left by all the previous epidemics to oppose the new virus. The question arose however whether the antibodies formed in response to the A and A1 viruses in preceding epidemics had not left some useful degree of immunity behind them even in the event of infection by a virus containing other antigens.

This question is discussed in two of the articles reviewed here. Slepushkin reports that in a factory near Moscow where there had been an outbreak of A1 influenza in the spring of 1957 several persons who fell ill then also had A2 influenza in the summer. However during the second of these outbreaks the sickness rate for those who had been affected in the spring was only half that for those who had not. The protection conferred by the attack of A1 virus was of short duration however the percentage of subjects protected by A1 antibodies had considerably fallen by the time of the autumn A2 influenza offensive.

Zhdanov observed that among children the course of influenza has two stages during the first the virus multiplies in the upper respiratory tract in the second it reaches the lungs probably through the blood. However this second stage was observed only rarely among adults because the latter probably enjoy partial immunity to the A2 virus acquired as a result of previous illnesses caused by other A group viruses. Virus which penetrates into the blood is stopped there by neutralizing or complement fixing antibody while the A A1 and A2 viruses give cross reactions in the corresponding tests. The same author wonders whether the trust placed in the haemagglutination inhibition test for assessing the immunity of the population is not excessive.

As soon as the epidemic appeared the question of vaccination arose. This was complicated by the fact that the A2 virus was antigenically different from its predecessors so that the virus strains used in previous years in various countries would very probably be more or less ineffective. Experience over the last twenty years has shown in fact that if it is to exert a protective action the vaccine must be prepared with a virus strain as close

as possible to the one causing the epidemic.

While work was being done to isolate the viruses as well as to study them serologically and prepare vaccines—whose low antigenicity as evaluated by the HI test called for considerable quantities of egg culture (up to one egg per dose)—the epidemic continued to advance. Of course the aim of vaccination was not to stop the epidemic which would have been a vain hope but to prevent the disorganization of the public services by excessive absenteeism and to protect those persons responsible for essential social and economic activities.

In several countries the main epidemic wave was receding when the vaccine became available in adequate amounts but in others where there was a second outbreak of influenza in the autumn or which were affected only in the closing months of 1957 certain population groups were vaccinated and the results were evaluated if not always with complete statistical accuracy at least reliably enough to give an adequate qualitative picture. Several of the Bulletin articles analysed here deal with the effects of vaccination.

Iceland

Vaccination commenced in September and was reserved for debilitated persons or those in poor health who would probably have had no natural resistance to the disease. A certain number of these persons were vaccinated while the other members of their households served as controls. The comparisons recognized as valid covered 92 households with 433 persons 118 of whom were vaccinated. Twenty two cases of influenza were noted among the 118 persons vaccinated and 219 among the 315 persons not vaccinated. A comparison of all vaccinated and unvaccinated persons of both sexes aged from 20 to 59 years shows that vaccination completely protected 67% of the group.

Japan

Vaccination was carried out in military camps factories schools and hospitals. In preparing vaccines with three different strains it was noticed that two of them were in the

TUBERCULOSIS A PERIOD OF TRANSITION

The tuberculosis programme of WHO has as its first objective the elimination of the disease as a public health problem. The article that follows discusses the Organization's work in this field. It is based on an address delivered by Dr. J. H. Holm, Chief Medical Officer, Tuberculosis, WHO Headquarters, at the Conference of the Tuberculosis and Health Association of Greater New York, November 1958.

There seems to be a fairly widespread belief that WHO was established mainly to assist the so-called under developed countries in improving their health services. While this is undoubtedly one of the Organization's functions, it also deals with matters of concern to highly developed countries. A case in point is the problem of tuberculosis.

Measuring tuberculosis trends

In a number of countries tuberculosis mortality and morbidity have dropped to such low levels in recent years that the responsible public health authorities have difficulty in planning their future tuberculosis programmes. The countries concerned have all for many years had tuberculosis control services including specialized institutions such as sanatoria and tuberculosis dispensaries. Their problem is to decide whether these institutions and other control efforts should be retained and if so for how long. There is a very real risk that as a result of their natural desire to save money the authorities will allow their allocations to the tuberculosis programme to follow the downward trend of tuberculosis mortality and morbidity. Such an economy measure might well benefit the tubercle bacilli rather than the public.

Tuberculosis remains a public health problem as long as healthy individuals are at a considerable risk of contracting tuberculous disease where such a risk exists the tuberculosis control programme with its specialized institutions must be maintained and perhaps even strengthened. To be able

to ascertain when the risk has been reduced sufficiently for specific control measures to be dropped it is necessary to have a practical means of measuring the tuberculosis problem in a community.

In many countries tuberculosis morbidity and mortality rates have so far been used as indicators of tuberculosis trends. The advent of effective antituberculosis chemotherapy has however made mortality figures almost useless for this purpose. Even morbidity rates can be misleading indicators since their interpretation requires an extensive knowledge of local conditions. Moreover morbidity figures are practically valueless for international comparisons since there is no internationally accepted definition of pulmonary tuberculosis.

Prevalence surveys of large samples of the population selected at random are a useful and practical means of ascertaining the extent of tuberculosis in countries where the disease has a relatively high prevalence (2-20 cases per 1000 adult population). This type of survey which is not dependent on the reporting of cases is also useful for international comparisons provided standard methods of examination are used. Periodic surveys make it possible to assess the trend of tuberculosis in a country and thus to evaluate the effect of a tuberculosis control programme. WHO has devoted much attention to the development of standard methods for tuberculosis prevalence surveys and has undertaken such surveys in several countries in Africa. When as the result of a tuberculosis programme the prevalence of tuberculosis in a country has been reduced to less than one case

to express the potency of a vaccine in haemagglutinating units and that in the case of vaccines prepared from strains belonging to the same antigenic subgroup the total nitrogen or protein nitrogen content may be a better indicator of relative immunizing power

USSR

Prophylactic tests with a live vaccine have been carried on since 1954. In 1957 large groups were vaccinated with A1 virus strains cultured on human lung tissue and administered by intranasal spraying. These strains conferred protection against reinfection on 60-70% of those vaccinated. The percentage of unprotected persons can be gradually decreased by re-vaccinations. In May 1957 a vaccine was prepared using a pool of A2 strains which had undergone not more than 5-7 egg passages. Passage in human tissue was omitted to save time. The optimum dose—taking into account the general reactions to the vaccine—was fixed at 0.05-0.1 ml. Some 3 000 000 persons were vaccinated at the beginning of the epidemic. The effectiveness (ratio between the percentage of cases in vaccinated persons and the percentage in unvaccinated persons) varied according to the town from 1.35 to 3.5.

Role of animals in influenza epidemiology

For more than twenty years certain animals have been suspected of playing a part in the epidemiology of influenza. In 1931 an A virus which caused an epizootic of an influenza-like disease was isolated from pigs in the United States; this was later considered to be the prototype of the virus which had caused the 1918 pandemic. Since then an active search has been made for the virus in pigs, horses and poultry. In 1956 a virus causing a serious equine disease was isolated

in Czechoslovakia. It was recognized in 1957 that the Asian (A2) virus had many antigenic properties in common with this equine virus. As soon as the 1957 epidemic began to spread WHO approached the veterinary services of a large number of countries and asked them to take blood specimens from pigs and horses—if possible both before and after the epidemic—and examine them for antibodies which might have developed following infection with A2 virus. These serological analyses summarized by Kaplan and Payne show that the A2 virus can cause natural infection in horses. Natural infection also occurs among pigs in the United States, Czechoslovakia and Germany although attempts to infect them experimentally have been unsuccessful. A2 virus was found in pigs in China at the outset of the epidemic; thus the possibility that influenza spreads from Eastern Asia starting in an animal harbouring the parent strain of influenza virus cannot be excluded.

Prospects for immunization would indeed be bright if it proved possible to discover the original strain of the viruses responsible for the recent epidemics and perhaps even for much earlier ones such as those of 1830 and 1782.

Although many authors have not found any trace of the virus or its antibody among pigs examined in their respective countries there can be no doubt that these animals play a role in influenza epidemiology. Not only can this fact be no longer ignored but research must be intensified to define this role more precisely. For the pig although it is a reservoir is not perhaps the first link in the chain and it has been suggested that invertebrates might be the carriers of latent virus particles which under certain favourable conditions would become infective for higher animals or even man.

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projects in which the problems of prophylactic treatment and chemoprophylaxis are being investigated on a community basis. Although much of this research is being carried out in population groups with a high or relatively high prevalence of tuberculosis it may well provide the answers to a number of questions related to the prophylactic use of the antituberculosis drugs in population groups with a much lower prevalence.

One important WHO supported study now in the planning stages involves the total population of Denmark outside the city of Copenhagen. Among this population only children in tuberculous families are BCG vaccinated before school age. When the children start school at the age of seven about 2/3 are found to be reactors to tuberculin. Up to a few years ago children of this age were offered BCG vaccination and almost all non reactors to tuberculin were vaccinated. The study now being planned has two aspects: preventive measures among children and adolescents and case finding and treatment among adults.

It is proposed to postpone BCG vaccination from the time of school entrance to the time of school leaving. On entering school each child will be given the standard tuberculin test. Those found to be reactors to tuberculin will receive INH during the first school year even if an X-ray examination reveals no sign of tuberculosis. At this time non reactors will not be vaccinated. At the beginning of the last normal school year (when the children are about 14 years of age) a further tuberculin test will be given. All children found to be reactors to tuberculin will be given INH for one year including those who have already had a course of INH at the age of seven. Those found to be non reactors to tuberculin will be BCG vaccinated so that the total adolescent and adult population will eventually be tuberculin positive.

In Denmark as in many other countries systematic examination for tuberculosis of population groups has in recent years been largely confined to so-called "organized" groups such as factory workers, state em-

ployees, soldiers etc. with a second examination often after an interval of only one year. This is obviously not the most profitable way of using the mass case finding units. More emphasis must be given to community screening for tuberculosis covering a higher proportion of people in the older age groups.

The best method of organizing and carrying out such screening is one of the problems being examined in connection with the WHO supported study. What is needed is a practical and economical method which would ensure that a high proportion of cases and potential cases are revealed. Another problem is that of pin-pointing—on the basis of community screening and in particular of mass chest X-ray examinations—the groups having a high risk of developing tuberculosis so that prophylactic treatment with INH can be given where it is most needed. For this purpose it will be necessary to keep under observation for several years large population groups which have undergone the standard examination for tuberculosis but in which no suspect cases have been treated. The groundwork for these investigations has been laid by the Danish Tuberculosis Index which was established in 1951 in co-operation with WHO. This Index contains individual records for the 1.5 million people examined in the nation-wide case finding programme of 1950-1952. All tuberculosis notifications and all certificates indicating tuberculosis as cause of death are matched with these records.

The elimination of tuberculosis as a public health problem is now a definite possibility. However, to apply the measures available for this purpose on a sufficiently large scale considerable changes will have to be made in existing tuberculosis programmes. During the transition period the exchange of knowledge and experience between countries will assume particular importance and it will be the task of WHO to ensure that this is carried out in the most effective way.

per 1000 adult population surveys of this type become impracticable since in order to obtain reliable estimates 50 000 100 000 persons would have to be examined in each community. At this stage the tuberculin test must be employed.

By tuberculin testing a sample of a few thousand children selected at random from the total child population the risk of infection existing in a given community can be assessed fairly precisely. When less than 1% of the children are reactors to tuberculin at 14 years of age then the risk of the contraction by a healthy person of a tuberculous disease is so small that tuberculosis can no longer be considered a public health problem in the community concerned. It is of the greatest importance that the methods used should permit direct international comparisons and this is one reason why WHO has devoted a great deal of time and effort to the complete standardization of tuberculin testing.

For example, through an Expert Committee on Biological Standardization the Organization has established an international standard for tuberculin which makes it possible to express doses of tuberculin in international units. With UNICEF it has taken the initiative in arranging for the preparation of a large batch of purified tuberculin (PPD) which has been carefully standardized by the tuberculin testing of population groups in different parts of the world; this batch is sufficient for 33 000 000 000 tests and should accordingly meet world needs for many years to come. In addition the WHO Tuberculosis Research Office has found a method of stabilising final dilutions of tuberculin to such an extent that they can be used for at least six months after preparation provided they are kept cold and protected from light. This method involves the addition of a non ionic detergent—Tween 80—to the diluent. On the basis of extensive experience in almost all parts of the world WHO has recommended a standard tuberculin test—the intradermal test with a single low dose—as well as standard methods for the reading of reactions and the reporting and recording of results.

Reducing the risk of tuberculosis infection

There are two highly effective methods which can be used today to reduce the risk of tuberculosis infection to the point where the disease ceases to be a public health problem. They are BCG vaccination and the use of antituberculosis drugs such as isoniazid (INH). These methods supplement one another and each has its own place in a tuberculosis programme.

As the result of two controlled trials conducted in the United States doubts have recently been raised about the protective effect of BCG vaccination. It must not be assumed however that BCG vaccination is a standard procedure since a great deal depends on the vaccine used, the method of application and other factors. A vaccination can only be considered as successful if re-testing of a sample of the vaccinated subjects shows that a sufficiently high degree of post-vaccination allergy has been induced. From much circumstantial evidence and from a controlled trial carried out by the Medical Research Council of Great Britain it is known that successful BCG vaccination gives a protection of the order of 80%. Moreover data collected in a number of countries in all parts of the world have shown that a sufficiently high degree of post-vaccination tuberculin allergy can be achieved by BCG vaccination when a potent vaccine and the proper method of vaccination are used. The controlled trials carried out in the United States would seem principally to confirm the well known observation that a BCG vaccination which does not produce strong and lasting post-vaccination allergy cannot be expected to confer a high degree of protection regardless of whether this unsatisfactory result is due to the use of a weak vaccine or incorrect methods of application.

While much is known about the use of antituberculosis drugs in the treatment of infectious cases and something about their use in the preventive treatment of potentially infectious cases, knowledge of their use in true prophylaxis is scanty. WHO is therefore taking part in a number of study and research

Statistics of the United Nations on a voluntary basis funds made available by UNICEF for programmes arranged jointly with WHO and funds from the Organization's Malaria Eradication Special Account. The amounts available during 1959 for work in the European Region are as follows: \$1 370 000 from the regular budget, \$776 000 from Technical Assistance Funds, and \$1 120 000 in UNICEF contributions.

Exchange of information

One of the main tasks of the European Office of WHO is to encourage exchanges of ideas and information between Member States on common health problems, e.g. health education, air and water pollution, immunization, cardiovascular disease, dental health, etc. The seminar on the psychiatric treatment of criminals and delinquents, held in Copenhagen from 28 April to 9 May 1958, is a good example of the usefulness of this type of meeting. The fact that the seminar was held in Denmark gave participants an opportunity to study the methods used for the treatment of criminal psychopaths in a country which has devoted special study to this problem. The meeting itself brought out some contrasts in national approaches to the subject, notably between Pavlovians and Freudians, but also revealed many points of similarity in practical methods and aims and showed participants of both schools of thought that there was much they could learn from one another.

Arising from these meetings or from consultations with governments are the studies of various kinds promoted by the Office which organizes technical conferences to review certain problems—e.g. tuberculosis control, radiation protection, neurotropic virus diseases—and to suggest to the Regional Office the course it should follow in dealing with them. The Office has helped to co-ordinate research on perinatal mortality carried out in several countries and has supported studies of mother and child separation in England, France and Germany. To facilitate exchange of information among sanitary engineers it has brought out a multilingual glossary of water and sewage terms.

Surveys undertaken in preparation for international seminars have enabled the Office to collect valuable information on such diverse topics as nursing education, modes of public health administration, mental hygiene practice, legislation in occupational health, and water pollution.

Education and training

WHO in Europe has been particularly concerned with making training available abroad for health workers who lack facilities in their own countries, with providing assistance to training institutions, often by supplying lecturers from other countries, with organizing training courses, and with studying educational trends, policies and standards.

Practically all countries in the Region participate in the WHO fellowships programme. The wealth of facilities for education and training in Europe means that many health workers from other regions come there to study and in fact about half the fellowships for study abroad granted by WHO are for studies in Europe.

Some examples of recent fellowships may be of interest: a British biochemical research worker has spent four weeks on a rapid visit to laboratories in Denmark, France, Germany, the Netherlands and Switzerland to obtain a view of work being done in those countries on the biochemical aspects of tissue and cell culture; a French health administrator has spent a month in the USSR studying public health organization; a Russian physician has taken a three-month course in anaesthesiology in the United Kingdom; a Swedish health physicist has spent five months in the United States studying the disposal of radio-active wastes; a German public health officer has taken a ten-month public health course in the United Kingdom; and a nursing educator from Angola has taken a year's nurse-tutor course in France.

Direct assistance to governments

WHO services to individual governments in Europe have been requested in a wide variety of fields, including the care of

HEALTH WORK IN EUROPE

The following account of the work of the WHO Regional Office for Europe is based on an article by Dr Paul J. J. van de Calseyde WHO Regional Director for Europe which appeared in the Journal of the American Medical Women's Association in November 1958

International health work may be said to have started in Europe where the first serious efforts to prevent the spread of epidemics from country to country were made during the second half of the nineteenth century. From 1900 on an increasing number of practical measures for the international control of disease were taken in Europe and the Office International d'Hygiène Publique (OIHP) with headquarters in Paris was founded in 1907. The disruption of the First World War was followed by intensive collaboration between nations in health work in Europe and elsewhere under the auspices of the Health Organisation of the League of Nations and the OIHP. The reporting of outbreaks of pestilential diseases was improved, the idea of preventing the spread of these diseases by protective barriers was gradually replaced by that of fighting them wherever they might exist and the first attempts were made to provide an international pool of health information and advice.

Foundation of the WHO Regional Office for Europe

In the years immediately following the Second World War emergency assistance was the order of the day in Europe. Hospitals and health institutions were in ruins and there was a shortage of medical personnel. Tuberculosis and venereal disease had increased to a dangerous extent, there were large numbers of war wounded, refugees and displaced persons as well as whole populations exposed to prolonged psychological stress or reduced

to starvation level. Substantial international aid was made available through the United Nations Relief and Rehabilitation Administration (UNRRA) and the International Refugee Organization (IRO) both now disbanded through the United Nations Children's Fund (UNICEF) through Red Cross Societies etc. By their efforts and those of individual countries the worst features of the emergency were overcome in a comparatively short time—by about 1950—and the level of health in Europe soon improved to above pre-war standards. Important factors in this rapid recovery were the long established tradition of public health in Europe and the general background of comparatively high development. In 1949 a special office for Europe was set up at WHO Headquarters in Geneva, two years later its work had expanded so much that its status was raised to that of a Regional Office.

Taken as a whole the European Region is perhaps the most developed of all the WHO Regions. In addition to Europe proper it includes the whole of the USSR, the whole of Turkey, Algeria, Morocco and Greenland—an area with a total population of about 610 million.

Site, staff and finances

Since 1957 the WHO Regional Office for Europe has been housed in Copenhagen in a building specially provided by the Danish Government. It has a staff of 95 including 18 health officers; the field staff is considerably smaller than that attached to the other WHO regional offices.

The funds of WHO and its regional offices are derived from regular contributions by Member States, United Nations Technical Assistance Funds contributed by Member

C. J. J. van de Calseyde (1958) *J. Am. Med. Ass.* 13: 439.
For a general account of the work of the OIHP, the League of Nations Health Organisation, see Ch. and I, 19: 8, 12, 65, 68.

States of the United Nations on a voluntary basis funds made available by UNICEF for programmes arranged jointly with WHO and funds from the Organization's Malaria Eradication Special Account. The amounts available during 1959 for work in the European Region are as follows: \$1 370 000 from the regular budget, \$276 000 from Technical Assistance Funds and \$1 170 000 in UNICEF contributions.

Exchange of information

One of the main tasks of the European Office of WHO is to encourage exchanges of ideas and information between Member States on common health problems, e.g. health education, air and water pollution, immunization, cardiovascular disease, dental health, etc. The seminar on the psychiatric treatment of criminals and delinquents held in Copenhagen from 28 April to 9 May 1958 is a good example of the usefulness of this type of meeting. The fact that the seminar was held in Denmark gave participants an opportunity to study the methods used for the treatment of criminal psychopaths in a country which has devoted special study to this problem. The meeting itself brought out some contrasts in national approaches to the subject, notably between Pavlovians and Freudians, but also revealed many points of similarity in practical methods and aims and showed participants of both schools of thought that there was much they could learn from one another.

Arising from these meetings or from consultations with governments are the studies of various kinds promoted by the Office, which organizes technical conferences to review certain problems—e.g. tuberculosis control, radiation protection, neurotropic virus diseases—and to suggest to the Regional Office the course it should follow in dealing with them. The Office has helped to co-ordinate research on perinatal mortality carried out in several countries and has supported studies of mother and child separation in England, France and Germany. To facilitate exchange of information among sanitary engineers it has brought out a multilingual glossary of water and sewage terms.

Surveys undertaken in preparation for international seminars have enabled the Office to collect valuable information on such diverse topics as nursing education, modes of public health administration, mental hygiene, practice legislation in occupational health, and water pollution.

Education and training

WHO in Europe has been particularly concerned with making training available abroad for health workers who lack facilities in their own countries, with providing assistance to training institutions, often by supplying lecturers from other countries, with organizing training courses, and with studying educational trends, policies and standards.

Practically all countries in the Region participate in the WHO fellowships programme. The wealth of facilities for education and training in Europe means that many health workers from other regions come there to study and in fact about half the fellowships for study abroad granted by WHO are for studies in Europe.

Some examples of recent fellowships may be of interest: a British biochemical research worker has spent four weeks on a rapid visit to laboratories in Denmark, France, Germany, the Netherlands and Switzerland to obtain a view of work being done in those countries on the biochemical aspects of tissue and cell culture; a French health administrator has spent a month in the USSR studying public health organization; a Russian physician has taken a three-month course in anaesthesiology in the United Kingdom; a Swedish health physicist has spent five months in the United States studying the disposal of radio-active wastes; a German public health officer has taken a ten-month public health course in the United Kingdom; and a nursing educator from Angola has taken a year's nurse tutor course in France.

Direct assistance to governments

WHO services to individual governments in Europe have been requested in a wide variety of fields, including the care of

premature babies (Austria France Italy Spain and Yugoslavia) the development of nursing services (Morocco and Turkey) vaccine production (Austria) gamma globulin production (Poland) health education (Italy) vital statistics (Turkey and Yugoslavia) the control of communicable eye diseases (certain western Mediterranean countries) malaria eradication (Turkey) the teaching of psychiatry (Denmark and Norway) and child guidance work (Ireland). These services are provided by means of discussions with governments visits from consultants the granting of fellowships activities for the promotion of education and training or the preparation of detailed plans of action. In a few instances field staff work directly with the national health services. UNICEF gives considerable material assistance in the form of supplies to many of the programmes mentioned.

The future

A number of new problems are now receiving attention from the Office and may be expected to take up an increasing amount of its time in the future. With the rapid development of the peaceful uses of atomic energy and its by products in Europe the training of personnel in health physics is becoming increasingly urgent. In arranging courses in this field for engineers chemists and public health administrators the Regional Office has been fortunate to obtain the co-operation of the Oak Ridge National Laboratory Tenn. USA the United Kingdom Atomic Energy Authority Harwell the Centre d'etudes nucleaires Paris and the Centre d'etudes pour les Applications de l'Energie nucleaire Mol Belgium. It is impossible to foresee the full effects of the peaceful uses of nuclear energy in the next decade but social change will certainly be stimulated and new problems may well be brought into man's social and mental life.

These developments may open up important new fields of health activity in Europe.

Increased attention is also being paid to chronic diseases and the public health aspects of ageing. At present the Regional Office is examining the accumulated information on the health problems of old age and considering how it can be put to the best use. For the study of cardiac and vascular diseases some internationalization of research—particularly epidemiological research—is considered necessary. A better understanding of the role of nutrition in the onset of these diseases may lead to far reaching changes. An obvious application would be in the field of hospital dietetics.

The hospital itself is in a period of transition formerly a centre for sheltered medical care it is now becoming a social unit with a new relation to the community at large. Here again the European Office of WHO can play its part by bringing members of related disciplines together for international exchanges of information and experience and by making training available for hospital administrators.

* * *

The Chronicle has published a number of articles on specific health activities in Europe. Some of the more recent of these articles have dealt with air pollution (January 1958) training of health physicists (February 1958) the anaesthesiology centre in Copenhagen (March 1958) veterinary public health (April 1958) neurotropic virus diseases (September 1958) psychiatry and the treatment of delinquency (October 1958) teaching of paediatrics (October 1958) dental health services for children (October 1958) research on cardiovascular disease (December 1958) public health nursing (February 1959). An account of another important field of WHO activity in Europe—mental health—will be found in the next article.

MENTAL HEALTH IN EUROPE

*Health problems in Europe may at first sight appear insignificant
 but the high infant mortality and the prevalence of malaria and
 venereal disease and the poor state of the mental hospitals in other parts of
 the world bring home the fact that the state of development
 in the various health problems of the world is not so uniform as it
 at first appears to be.*

Nature and extent of the problem

While it is difficult to assess the exact prevalence of mental disorders in Europe it appears to be much the same in all parts of the Region. As far as can be ascertained from hospital statistics this applies to the rate of psychosis and throughout Europe neurotic disorders figure with equal prominence in the records of general practitioners and specialists in internal medicine. Certain countries have special mental health problems: suicide rates are high in Scandinavia particularly in Denmark; alcoholism is widespread in France and Switzerland and is increasing in Sweden. More general problems include delinquency, behaviour disorders in children, subnormality and the upbringing of neglected and deprived children for it is now recognized that retarded psychological development is the rule among children brought up in institutions. The characteristic mental health problems of old age also require more attention as health standards improve and the life span increases.

Mental health practice in Europe

For many decades the European countries have assumed increasing responsibility for the care of the less fit of their citizen and mental health work in Europe is to a large extent a development of the social services. Thus the records of hospitals and physicians give only a partial idea of the scope of this work since the activities of, for example,

children's homes and services for adoption have also to be taken into account. The professional psychiatric journals are no more helpful in this respect since they are primarily concerned with special cases, special theories and special treatments and have little to say about the work of psychiatrists in industry and school, vocational guidance, the after-care of psychotics, research on mental health in old age or general work in the field of delinquency.

The question of the organization and payment of medical services is particularly important in connexion with mental health activities because of the need for team work between the social and medical services—the characteristic child guidance team for example consists of a psychiatrist, a psychologist and a social worker. The USSR emphasizes the close connexion between preventive and therapeutic medicine and its medical services tend to be organized so that hospital work, out-patient work and home care are all arranged by the same centre and come under the same direction; moreover these services are based on a full-time salaried system which eliminates a number of financial complications. The Scandinavian countries and the Netherlands have developed their medical services on a local basis: in Finland for instance the financing of medical services is almost always done by small communities. In France where payment for medical care is often reimbursed by the state there is a growing tendency to combine medical and social services. These variations in practice mean that a more or less different approach to mental health work is required in almost every country.

This survey of mental health in Europe was undertaken by Dr. David F. Buckley, Regional Officer for Mental Health, WHO Regional Office for Europe, which appeared in the *Journal of the American Academy of Child and Adolescent Psychiatry*, November 1953, no. 1, pp. 1-4.

The role of WHO

While the solution of mental health problems in Europe primarily requires more time effort money and training there is also a need for more knowledge and co operation within the medical paramedical and social services It is here that WHO can be of particular assistance

Direct advice to countries about their mental health problems is rarely sought and rarely needed more important is the assistance WHO can give through inter country meetings Therapeutic work and in particular preventive work in mental health require the simultaneous co operation of private and public health physicians psychiatrists nurses psychologists and social workers The inter country meetings on mental health held by the European Office of WHO provide an opportunity for free discussion of the respective functions of members of the mental health team and of common problems arising in practice New developments in the therapy and prevention of mental disorders are brought forward and a process of mutual education takes place The decisions on when and where such inter country meetings are held and on the topics to be discussed lie to a great extent with WHO itself although they are always based on the recommendations of the member countries of the Region

In the early years of WHO the Organization's Expert Committee on Mental Health issued two important reports the first of which stressed the value of preventive work in mental health and suggested that public health services should be encouraged to assume the responsibility for promoting the mental as well as the physical health of the population¹ This theme was developed in greater detail in the Committee's second report which dealt with the adaptation of the public health services to include mental health activities and indicated the necessary changes in professional education and training The practical problems raised in these reports were subsequently explored by two inter country meetings convened by the

Regional Office for Europe At a further meeting to be held by the Office this year a wide range of mental health subjects will be discussed including preventive work with children the avoidance of stress ways and means of providing early treatment for mental disorders the organization of the necessary medical and social services and training

Mental health in childhood

From the outset WHO has been particularly concerned with the question of mental health in childhood and its Monograph Series opened with two important publications on the subject *Psychiatric Aspects of Juvenile Delinquency* by Dr Lucien Bovey and *Maternal Care and Mental Health* by Dr John Bowlby The European Office has convened two seminars on child guidance the first for the northern European countries was held at Lillehammer Norway in 1952 and the second in Lausanne Switzerland in 1956 A Joint Expert Committee on the Mentally Subnormal Child on which the United Nations ILO and UNESCO were represented was convened by WHO in 1953² and a seminar on the same subject was held at Oslo by the Regional Office for Europe in 1957 A European seminar on the therapeutic and preventive aspects of the care of subnormal children is planned for this year Preventive work in connexion with mental health in childhood will be explored more fully in a later seminar

Other mental health problems

Co operation between the European Office of WHO and the Social Defence Section of the United Nations in the field of the prevention of crime and the treatment of offenders has led to two important seminars the first on methods of diagnosis and the second on the psychiatric treatment of criminals and delinquents

The European Office is at present engaged in a survey of drinking patterns attitudes towards drinking and alcoholic disorders in various countries This survey has already

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Wld Hlth Org J R p S 1954 75

shown striking differences between the countries of Northern Europe and the wine producing countries. An understanding of drinking habits will permit practical recommendations for the prevention of alcoholism to be made.

Mental hospital practice which was the subject of the third and fifth reports of the WHO Expert Committee on Mental Health⁴ is changing rapidly in Europe as a result of the abolition of restrictive legislation in this domain the "open door" policy and the

introduction of more active therapies—psychological social and physical. These changes call for a new approach by the psychiatric nurse as well as by the psychiatrist. A seminar to consider how the training of the psychiatric nurse should be adapted to changes in mental hospital practice was held by the Regional Office for Europe in 1957.

Finally special studies on the epidemiology of mental disorders have been undertaken at WHO Headquarters and these will be followed up by specific surveys and studies of the subject in Europe.

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RECOMMENDED ADDITIONS TO THE MEDICAL CURRICULUM

The fifth report of the WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel dealing with the introduction of radiation medicine into the undergraduate medical curriculum¹ was the subject of an article in the February 1959 number of the Chronicle².

There was a strong case the Committee thought for the introduction of such techniques as visual aids into the teaching of radiation physics. Documentary and animated films, scale models and visits to installations would be most helpful and the students should carry out suitable experiments at various stages of their pre-clinical and clinical studies. The Committee prepared a list of examples of the kind of laboratory experiments, demonstrations and practical work that might profitably be included in the undergraduate medical curriculum. This list is reproduced below.

Physics

- Use of G.M. counter
- Use of scintillation counter
- Use of ionization chamber
- Determination of half-life of an isotope
- Absorption curves of various types of radiation
- Photographic effect of radiation
- Presence of cosmic rays
- Absorption by various materials
- Wilson chamber
- Fluorescence and phosphorescence

- Contamination of glassware with radioactive isotopes
- Decomposition by nuclear disintegration technique
- Oxidation of Fe^{++} to Fe^{+++} by ionizing radiation (concept of indirect effect)

Medical statistics

- Determination of a Gaussian frequency curve

Biochemistry

- Use of an isotope in specific trace experiments in animals
- Enzyme inactivation by X-rays and its effect

Chemistry

- Measurement of reaction velocity by means of radioactive isotopes

Anatomy

- X-ray to demonstrate anatomical facts

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Physiology

- Haemodynamics (Na^{24})
- Thyroid function test (I^{131}) in rats
- Thyroid ablation (I^{131}) and myxoedema
- Fluoroscopic demonstration of deglutition etc

Histology

- Radioautography (e.g. uptake of I^{131} in chick embryo)

Genetics and cytology

- Demonstration of increased mutation frequency (in *Drosophila* or *Neurospora*) after exposure to X rays
- Chromosome breakage and types of chromosomal aberrations induced by ionizing radiations (e.g. meiotic and somatic chromosome damage in *Tradescantia* suitable animal cells and tumours)

Histopathology

- Modifications in cells and tissues following ionizing irradiation (e.g. intestinal epithelium *Vicia faba*)

Gross pathology or morbid anatomy

Local effects

- Erythema
- Burns
- Neuroses

General effects

- Effects on bone marrow and blood forming organs
- Effect on intestines
- Cancer leukaemia

Radiology

Demonstration of pertinent techniques of fluoroscopy and radiography

Dose measurements in ordinary X ray series

Effect of voltage on half value layer in several materials and on visibility of soft tissues and bone Demonstration of minimum shadow visible in the chest Effect of cone and Bucky diaphragm Disappearance of soft tissue immersed in water

Internal medicine clinical pathology isotope laboratory radiology

G.M. measurements

S. intillation counters

Thyroid function test (thyroid uptake and urinary excretion of I^{131})

Participation in diagnosis with isotopes routinely used in the medical clinic for special purposes blood volume (serum albumin I^{131}) red cell life span (Cr^{51}) etc

Formal organized course

Repetition of certain previous experiment

Demonstration of nervous system death in spinal death bone marrow death etc in rats or mice

Demonstration of effect of oxygen removal (*E. coli*)

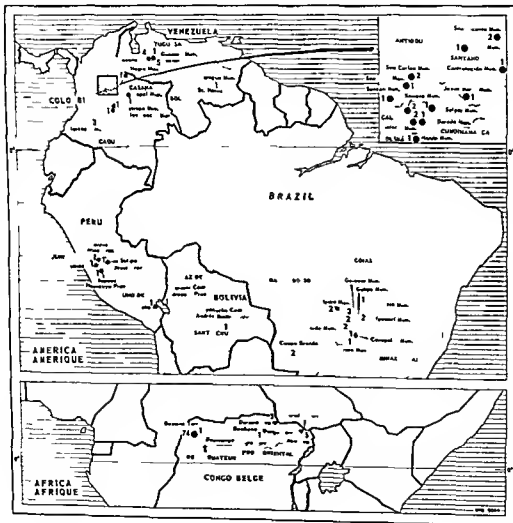
Demonstration of protection by compound of the cysteine-cysteamine group (mice)

Weight changes of various organs following exposure to ionizing radiation

Demonstration of the indirect effect

YELLOW FEVER IN 1958

A recent number of the WHO *Weekly Epidemiological Record* (No 7 1959) contains the following information on the incidence of yellow fever in 1958. According to official notifications 56 cases of jungle yellow fever were reported in South America in 1958 (as compared with 74 in 1957) of which 23 occurred in Colombia, 16 in Brazil, 10 in Venezuela, 5 in Peru and 2 in Bolivia (see accompanying map). Except for one case in the Puno area of Peru, all cases occurred in areas where the disease had occasionally been reported.



during the last ten years. No evidence of the presence of yellow fever in vertebrates other than man was officially notified in America during 1958.

In Africa all cases reported in 1958 occurred in the Belgian Congo north of the equator. 75 cases were recorded in the Gemena area of the Equateur Province while 9 were recorded in three areas of the Orientale Province. Of these 8 were in the Doruma and Aba areas in the north eastern part of the country where no human cases had been reported for twenty years.

POISONING AS A CAUSE OF DEATH

Deaths caused by poisoning may be accidental or deliberate (suicides and homicides). Although accidental poisoning is certainly preventable the period 1950-1956 witnessed an increase in the number of deaths from this cause in eight countries. In six other countries the frequency of such deaths does not show any significant trend and in one other (the United States) they are on the decline. These and other interesting facts on poisoning as a cause of death can be gleaned from the statistics published in the WHO *Epidemiological and Vital Statistics Report* (Vol. 11 No. 8 1958) in which data on deaths caused by poisoning (accidents, suicides and homicides) are presented for fifteen countries¹ for which detailed statistics are available. Only a few aspects of the subject are covered here; more information will be found in the 78 pages of tables in the above mentioned publication.

Accidental deaths due to poisoning

The frequency of accidental deaths due to poisoning—rate per one million population—varies widely in the fifteen countries considered from 10.6 (Italy) to 49.0 (Scotland) for males and from 5.6 (Norway) to 49.5 (Scotland) for females. A high mortality from accidental poisoning (near or over 30.0 per million) is also observed in Denmark, France and England and Wales.

Deaths from poisoning represent 14.8% of all accidental deaths among females in Scotland, 9.5% in England and Wales, 8.0% in France and 7.8% in Denmark. The

highest proportions of deaths due to poisoning in the male population are 8.3% in Scotland, 6.7% in Denmark and 5.4% in England and Wales. These data indicate the importance of accidental poisoning as a cause of death and the need for preventive measures.

Deaths from this cause are particularly frequent in certain age groups reaching a peak in the age group 0-4 years and again in the age group 45 years and over with in general a rapid increase in the highest age groups (75 years and over). In the youngest age group 0-4 years mortality from accidental poisoning is higher among children of 1-4 years than among infants in most of the countries studied.

The proportion of female deaths due to accidental poisoning in relation to total accidental deaths is almost invariably at its highest in the age group 25-44 years. Exceptions are England and Wales, Sweden and Switzerland where the proportion is slightly higher in the age group 45-64 years.

It should be noted that deaths among females due to analgesic and soporific drugs account for about 30% or more of accidental poisonings in Australia, Canada, Denmark, Japan, New Zealand, Sweden and the United States which may indicate an abuse of these drugs in the countries concerned.

Utility (illuminating) gas is still the most frequent cause of accidental poisoning in most of the fifteen countries studied. It is responsible for 40% or more of accidental deaths due to poisoning among females in nine of them and among males in seven of them. Combustion gases are responsible for a relatively high proportion of accidental poisonings in Belgium, France and Holland.

¹ Australia, Belgium, Canada, Denmark, England and Wales, France, Italy, Japan, Netherlands, New Zealand, Norway, Scotland, Sweden, Switzerland, United States.

**PERCENTAGE OF DEATHS DUE TO CERTAIN TYPES OF POISON
IN RELATION TO ALL ACCIDENTAL DEATHS BY POISONING**

Co try	A l c f d s p f drug		U t i l i t y		C o m b u s t i o n	
	M	F	M	F	M	F
A t r a l (1954-1956)	20.9	30.1	19.6	20.1	4.3	4.2
B l g m (1954-1955)	4.8	10.0	40.8	4.5	76.5	26.2
C a d (1954-1956)	12.1	37.5	27.7	30.5	23.3	8.5
D m k (1954-1956)	19.8	31.1	46.0	5.8	19.1	7.2
E n l d d w l (1954-1955)	20.7	23.7	36.9	69.6	7.4	1.7
F (1954-1955)	6.1	8.8	2.5	3.2	23.4	21.0
I t l y (1953-1955)	6	4.8	29.6	40.0	16.3	11.8
J p n (1954-1956)	19.8	19.2	7.2	11.7	13.9	1.3
N t h l d (1954-1956)	7.0	4.9	30.5	36.6	17.2	24.1
N w Z a l d (1953-1955)	14.6	10.0	37.5	4.0	6.2	10.0
N r w y (1954-1955)	13.3	27.8	4.0	1.3	6.0	6.9
S t l d (1954-1955)	16.1	19.8	74.5	77.1	1.1	—
S d (1953-1955)	2.7	49.6	11.3	19.4	30.4	8.3
S w e d (1954-1955)	—	—	41.4	81.8	14.4	4.1
U t d (1954-1956)	10.7	34.6	19.5	22	74.2	12.3

among both sexes and among males in Sweden (30.4%) Canada (23.3%) and the United States (25.2%). It would be useful to bear these facts in mind when taking measures to prevent accidental poisoning.

The proportion of deaths due to poisoning by analgesic and soporific drugs by utility gas and by combustion gases to all deaths due to accidental poisoning for both males and females is shown in the accompanying table.

Suicides

Suicide by poison is even more frequent than accidental poisoning; this applies to all the countries studied except Canada and France (both sexes), Scotland (females) and Italy (males). In Japan the death rate from accidental poisoning is 20.4 for males and 9.1 for females per one million population while the rate for suicide by poison is 135.6 for males and 83.4 for females; the situation is almost the same in Denmark, England

and Wales and Sweden. The proportion of suicides in which poison is used ranges from 7.7% (France) to 54.5% (England and Wales and Scotland) for males and from 20.9% (France) to 66.6% (Denmark) for females. In all fifteen countries poison is used by a higher proportion of female suicides than of male suicides except in Japan where the rates are roughly the same for both sexes.

Homicides

In only a few countries is there a relatively high proportion of homicides by poisoning, the highest being in Denmark where poison is used in 33.1% of all homicides of males and 35.6% of all homicides of females. In England and Wales the proportions are 16.7% for males and 17.2% for females. In two countries (Netherlands and Switzerland) poisoning accounts for about one in every ten homicides; in most of the other countries studied however the proportion is much lower.

Reports of Expert Groups

HOSPITAL LABORATORY SERVICES *

In his inaugural address as President of the Eleventh World Health Assembly in May 1958 Dr Leroy E Burney claimed that it was a paramount responsibility of the world health community to reduce the lag between the discovery of new knowledge and its application.¹ The hospital laboratory with its highly trained medical and scientific staff plays an important part in bridging this gap and the services it provides are in fact essential if modern methods are to be used in the diagnosis prognosis treatment and prevention of disease. A recently published report of the WHO Expert Committee on Health Laboratory Methods reviews existing hospital laboratory services and contains recommendations for improving them.

Present situation

On the basis of information collected from 22 countries the report shows that grave defects exist in the hospital laboratory services in many parts of the world either because the services have not been sufficiently developed or because conflicting interests have led to a complex heterogeneity of laboratories not always organized in the best interests of the community as a whole. Depending on the country the hospital laboratory services may be administered by the central provincial district or municipal

government or by hospital boards universities or research organizations. Wide variations are also found in the organization of the laboratories depending in part on the nature of the diseases prevalent in the country in part on the distribution of the population and in part on the geographical conditions and the political and administrative structure. Naturally the type of hospital also influences the quality and amount of laboratory service provided the regional hospital usually having the most highly developed laboratory service and the local hospital the least while the rural type of local hospital seldom has any laboratory services available.

Functions of hospital laboratories

The services traditionally supplied by hospital laboratories include morphological pathology (morbid anatomy histopathology histochemistry and exfoliative cytology) chemical pathology microbiology (bacteriology parasitology mycology virology and immunology) and haematology. The report points out that these functions do not necessarily represent the divisions of any single laboratory in countries with more highly developed laboratory services each of the major laboratories may comprise a group of integrated units but in countries with less developed laboratories such a division of functions may not be possible. In some countries medical biophysics is being developed as a function of hospital laboratories since a number of biophysical techniques are emerging as useful in diagnosis particularly the use of radioisotopes. The complex tests of physiological function carried out in many clinical departments have in a few countries been concentrated in departments of clinical physiology and laboratory tests for allergy although usually

WHO Expert Committee on Health Laboratory Methods
(1959) Secretariat Report No. 1611 30 pages Price 1/9 \$0.30 or
Swfr 1— Also published in French and Spanish

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The members of the Committee were: Dr J. Desbois
France, Dr L. E. Burney, Czechoslovakia (Vice-Chairman),
Professor V. S. Manglik, India, Professor J. F. M. U.
of South Africa (Rapporteur), Dr K. B. R. Gers, United Kingdom,
Dr M. Prof. J. F. S. L. USSR, Dr G. Z. Willem, USA
(Chairman), The Secretariat consisted of Dr A. L. B. O. WHO
Dr H. S. Ericson, Sweden (Consultant), Dr R. S. Z. on
WHO (Secretary).

considered clinical procedures are occasionally performed in the hospital laboratory

The report advocates that research should also be regarded as part of the function of every laboratory and points out that it is essential to the development and maintenance of an adequate standard of laboratory practice. Even if the laboratory does not engage in fundamental research there are many methodological epidemiological and clinical problems that it can help to solve. While these necessitate close collaboration between the laboratory and the clinical departments this does not mean that the laboratory research must be directed by a clinician nor that the head of the laboratory should not undertake independent investigation. Moreover the report stresses that no laboratory results should be used by the clinician for research purposes except in collaboration with the pathologist and that the pathologist should not try to evaluate the clinical importance of results except in consultation with the clinician. In university centres collaboration between the hospital laboratory and science departments is as important as collaboration between the laboratory and the clinical departments.

Relationship between hospital and public health laboratories

Although a public health laboratory service is concerned primarily with the health of the community and a hospital laboratory with the health of the individual there is much overlapping of function and in most countries the two services show some degree of integration. The less developed the community or hospital the more probable it is that one laboratory will provide both services. Complete integration of the two services can only exist however if they are both administered by a government authority either directly or through some other organization such as a medical research council. In practice the hospital laboratories are more often responsible only to the hospital they serve and consequently tend to be more diversified in their standards, techniques and organization than the public health labora-

tories which are responsible to a government department.

One of the major advantages of integration is the elimination of overlapping functions particularly in the field of microbiology. Much duplication of accommodation and equipment can be avoided with a considerable saving in administrative costs. An integrated service also places emphasis on the important preventive aspect of medicine and it brings together the clinician, the pathologist and the medical officer of health who may seldom have professional contact if the public health and hospital laboratories operate independently. Particularly in those countries that have vast densely populated areas but little or no laboratory service and often enough no medical or sanitary service there is an urgent need for a single system fulfilling the dual function of a hospital and public health laboratory service. Simple diagnostic facilities of the out-patient type could well be provided by mobile laboratories. The report emphasizes that in spite of the advanced state of public health and the high standard of hospital pathology in many countries there are still large areas of the world where such simple all-purpose laboratory services are badly needed.

Against integration of the hospital and public health laboratory services it may be argued that the pathologist is liable to concentrate on the diagnostic problem of the individual hospital patient and to lose sight of the welfare of the community. Moreover separation of the two services enables training to be more specialized and a higher degree of technical and professional proficiency to be obtained. There is thus much to be said for this system in highly developed countries with extensive hospital and laboratory services but in less developed countries in which trained professional and technical staff are at a premium the advantages of integration outweigh its disadvantages.

From the review of existing conditions the report concludes that a well-organized and closely integrated system of laboratories is at present to be found in only very few countries and that in all others there is some need for better co-operation. Whether the two ser-

vices should be separate or should be partly or completely integrated can only be decided in the light of the available personnel the degree of development of the country and its traditions geographical and sociological features and medico political pattern At all events where there is a dual system of laboratories close collaboration should be established between the two services and the smaller laboratories should be provided with technical assistance and supervision

Planning and organization of hospital laboratory services

The type size and organization of hospital laboratories will be influenced by a number of factors including the extent of the existing hospital and public health laboratory services the general health status of the population its age structure density and distribution and whether it is increasing static or decreasing The health status and epidemiological problems of adjacent territories will also have to be considered Expansion should start with the regional hospital and proceed downwards to the local hospitals so that priorities can be established according to a predetermined plan and within the available financial resources

The report lays emphasis on the need to allocate an adequate amount of space in planning a hospital laboratory with provision for future growth of the hospital out patient department specialized clinics and population served as well as for an increasing demand for laboratory tests as medical sciences advances The laboratory should not be relegated to some remote part of the building but should be sited on a main hospital traffic lane so that it is easily accessible to the clinical staff When designing the laboratory it is important that careful thought should be given to the nature of the equipment to be included especially in the case of larger or specialized laboratories

Among a number of budgetary considerations to which the report draws attention are the need to make adequate provision for the replacement of equipment before it has deteriorated to the stage where it acts as a

brake on the efficiency of the laboratory and the importance of setting aside a portion of the budget to cover technical assistance for research activities Scientific problems of a more extensive nature however should be supported by some foundation for scientific research or by special funds

Facilities and staffing of hospital laboratories

The report advocates that every hospital however small should possess a laboratory within its own precincts but the extent of the facilities to be provided will naturally depend on the size of the hospital Both in the regional hospital (usually 300 beds or more) and the intermediate hospital (usually 100 to 300 beds) the laboratories should be equipped and staffed to carry out the more important procedures in chemical pathology microbiology and haematology Except in the smaller intermediate hospitals a service in morphological pathology should also be available on the premises Wherever possible the regional hospital laboratories should comprise in addition a number of supplementary units specialized in such techniques as biophysics and virology In the largest centres complete diagnostic research training reference and consultant facilities must be available

One of the limiting factors in establishing or expanding a hospital laboratory service is likely to be the difficulty of finding suitable personnel Every effort should therefore be made to organize an adequate training programme and to provide working conditions that will attract workers of the highest quality In the largest hospitals laboratory units with satisfactory facilities for the training of technical and auxiliary personnel should build up a corps of skilled laboratory workers which can be used to establish laboratories in the smaller hospitals The report recommends that all hospital laboratory staff should be employed on a full time basis and that remuneration should be adequate to ensure that the economic status of medical and technical laboratory personnel is equivalent to that of their colleagues in other fields of medicine

The director of a laboratory in a regional or intermediate hospital should have had a long training in the main branches of clinical pathology and also some clinical experience. He must not only supervise the work of his staff but also act as consulting colleague to the clinician helping him to seek solutions to his clinical problems by the application of new or established laboratory methods. The staff working under him should include a number of assistant pathologists (medical or non medical graduates) as well as technicians laboratory aides and administrative and clerical staff. Non medical graduates are frequently in charge of special sections of the laboratory and when they carry senior administrative responsibility they should be given an equivalent status to their medical colleagues.

The local hospitals have less need of a full range of laboratory tests and it may be sufficient for them to be staffed by technicians under the control of a clinician and a visiting pathologist. It is noted however

that in some countries these small hospitals serve a vast population so that although the number of beds is small the volume of out patient laboratory work is very large. In such cases the staff should include non medical graduates under the control of a full time pathologist.

The number of staff allocated to a laboratory should be in proportion to the work load. The Committee was of the opinion that the "unit" systems for measuring the work load which have been used in various countries are expensive cumbersome and unscientific and do not provide more information than a simple determination of the mean number of tests carried out per unit time. An excessive work load not only impairs efficiency and accuracy but also increases occupational risks especially in work on tubercle bacilli enteric pathogens and viruses. It is recommended that rules for laboratory hygiene and the prevention of laboratory infections should be worked out on an international level.

AUXILIARY DENTAL PERSONNEL

The need for improved dental health services has been recognized for some years. While the longer period of training now considered necessary for dental practitioners undoubtedly increases their efficiency it also means more expensive services. As a result the work of the fully qualified dentist is being increasingly supplemented by that of auxiliary personnel operating at lower levels of responsibility.

The dental health team consisting of a dentist and one or several competent auxiliaries has proved successful in a number of countries with well organized dental health services. To determine to what extent the adoption of this system might help to solve dental health problems in other countries—and particularly in those which at present

provide little or no dental care—WHO convened an Expert Committee on Auxiliary Dental Personnel¹. The report of this Committee has now been published.

The dental hygienist, the "school dental nurse" the "dental laboratory technician" and the "chairside assistant" are among the auxiliary members of the dental health team. Their tasks vary some of them are not allowed any contact with the patient others are qualified to give limited dental treatment in accordance with the regulations in force and with their individual training.

The programme for dental health care recommended in the report is intended

WHO Expert Committee on Auxiliary Dental Personnel (1959) Report (M.I.H. Org. No. 163), 3 pages. Price 1 \$0.30 or Sw fr 1.— Also published in French and Spanish.

The members of the Committee were: Dr James Deen (Ireland), Dr A. I. Donikov (USSR) (Vice-Chairman), Dr A. Maxwell Hume, U.K., Dr Olof K. Osvald, Sweden, Dr Sha Lee Peterson, USA (R. Secretary), Dr J. Llewellyn S. dees, New Zealand (Chairman), Dr L. J. Sundram, Malaya. The Secretariat consisted of: Dr Mario Chavez, PASO, Dr J. S. Peterson, WHO, Dr Carl L. Sebelius, WHO (Secretary), Dr W. Swast Rosen, United Kingdom (Consultant), Professor F. C. Wilkison, United Kingdom (Consultant).

vices should be separate or should be partly or completely integrated can only be decided in the light of the available personnel the degree of development of the country and its traditions geographical and sociological features and medico political pattern At all events where there is a dual system of laboratories close collaboration should be established between the two services and the smaller laboratories should be provided with technical assistance and supervision

Planning and organization of hospital laboratory services

The type size and organization of hospital laboratories will be influenced by a number of factors including the extent of the existing hospital and public health laboratory services the general health status of the population its age structure density and distribution and whether it is increasing static or decreasing The health status and epidemiological problems of adjacent territories will also have to be considered Expansion should start with the regional hospital and proceed downwards to the local hospitals so that priorities can be established according to a predetermined plan and within the available financial resources

The report lays emphasis on the need to allocate an adequate amount of space in planning a hospital laboratory with provision for future growth of the hospital out patient department specialized clinics and population served as well as for an increasing demand for laboratory tests as medical sciences advances The laboratory should not be relegated to some remote part of the building but should be sited on a main hospital traffic lane so that it is easily accessible to the clinical staff When designing the laboratory it is important that careful thought should be given to the nature of the equipment to be included especially in the case of larger or specialized laboratories

Among a number of budgetary considerations to which the report draws attention are the need to make adequate provision for the replacement of equipment before it has deteriorated to the stage where it acts as a

brake on the efficiency of the laboratory and the importance of setting aside a portion of the budget to cover technical assistance for research activities Scientific problems of a more extensive nature however should be supported by some foundation for scientific research or by special funds

Facilities and staffing of hospital laboratories

The report advocates that every hospital however small should possess a laboratory within its own precincts but the extent of the facilities to be provided will naturally depend on the size of the hospital Both in the regional hospital (usually 300 beds or more) and the intermediate hospital (usually 100 to 300 beds) the laboratories should be equipped and staffed to carry out the more important procedures in chemical pathology microbiology and haematology Except in the smaller intermediate hospitals a service in morphological pathology should also be available on the premises Wherever possible the regional hospital laboratories should comprise in addition a number of supplementary units specialized in such techniques as biophysics and virology In the largest centres complete diagnostic research training reference and consultant facilities must be available

One of the limiting factors in establishing or expanding a hospital laboratory service is likely to be the difficulty of finding suitable personnel Every effort should therefore be made to organize an adequate training programme and to provide working conditions that will attract workers of the highest quality In the largest hospitals laboratory units with satisfactory facilities for the training of technical and auxiliary personnel should build up a corps of skilled laboratory workers which can be used to establish laboratories in the smaller hospitals The report recommends that all hospital laboratory staff should be employed on a full time basis and that remuneration should be adequate to ensure that the economic status of medical and technical laboratory personnel is equivalent to that of their colleagues in other fields of medicine

similar groups. The use of school dental nurses permits a dental health programme employing only a few dentists to reach large numbers of children.

Evolution of dental health services

Generally speaking it may be said that three categories of persons at present provide dental care: i.e. professionally qualified dentists, auxiliary personnel and non-qualified persons. With the development of dental health programmes the last named category is tending to disappear.

The dental profession has evolved very rapidly and the wide divergencies existing today are due to the fact that dental services in the various countries are at different stages of evolution. In some dental treatment may be in the hands of a few untrained persons who devote all or part of their time to dental work while in others dental health teams working under the supervision of qualified dentists are dealing efficiently with very large numbers of people.

Some developing countries have endeavoured to organize dental services from the outset on the lines adopted in the more advanced countries by introducing com-

prehensive training courses for dentists. These programmes have failed largely because the few dentists it has been possible to produce were insufficient to attend to the needs of any considerable part of the population and confined themselves to the upper income groups leaving the others still in the hands of unqualified practitioners.

In general it may be said that the lower the number of inhabitants per dentist the higher the standard of dentistry. The report publishes a table—reproduced here—showing population/dentist ratios throughout the world classified by continent.

In considering these ratios it must be remembered that even in countries with less than 2000 inhabitants per dentist adequate dental care may still not be available to certain sections of the population.

Use of auxiliaries in countries with organized dental services

The report recommends that particular emphasis be laid on prevention. This is a field in which certain types of auxiliary (e.g. the dental hygienist and the school dental nurse) play a very important role. With the creation of dental health teams the dental

POPULATION IN THOUSANDS OF COUNTRIES AND TERRITORIES WHICH FALL WITHIN SPECIFIED RANGES OF POPULATION PER DENTIST RATIOS

	Population per dentist				
	0-1000 (p. 1)	100 000-1 000 000 (p. 2)	10 000-1 000 000 (p. 3)	3000-1 000 000 (p. 4)	1 000 000-3000 (p. 5)
All	51 000	27 03	63 681	4	
A	760	45 497	131 670	5 352	89 888
E.rop	—	—	74 080	1 3740	97 144
North America	—	—	—	197	193 408
Latin America	—	—	61 103	87 117	21 279
Oceania	—	1572	1 003	88	11 273
Total	760	63 67	336 37	72 566	39 777

Source: Data from the United Nations Statistical Yearbook 1955 and 1956. Figures are in thousands.

particularly for countries where services are just starting. It provides for extension in the training of personnel and thus for continued improvement in the quality and scope of the services. It is recommended that the dentists themselves be given some instruction on how to make the best use of auxiliary personnel.

Functions and training of auxiliary personnel

The report advocates formal training courses for each category of auxiliary staff.

The *chairside assistant* who receives the patient, prepares the instruments and necessary material etc. is considered to be an indispensable member of the dental team. Training for this category of personnel will naturally vary according to the services to be rendered. Generally speaking, candidates should have completed secondary education and should be given a year's training course with instruction in sterilization, preparation of filling and impression materials, care of instruments, record keeping, first aid etc.

The specific task of the *dental laboratory technician* is to make prosthetic and orthodontic appliances under the direction of the dentist and without any contact with the patient. Candidates must have sufficient basic education to enable them to assimilate a two-year or possibly three-year technical course. They will be taught the elementary principles of physics, chemistry and the biological sciences in relation to their specific duties: the correct handling of the materials used in their work and the care of instruments and equipment. They will also be instructed in the techniques used in the making of complete or partial dentures, ceramics and porcelain work, crowns, bridges etc.

The report stresses the importance of the *dental hygienist* who can work either as an auxiliary under the close supervision and direction of a dentist in private practice or as a member of the public health team with a certain amount of autonomy. The dental hygienist's work is extremely useful because it reaches a very large sector of the population. It includes the cleaning of teeth and the removal of calculus, individual and

group instruction on oral hygiene, topical application of fluorides or other prophylactic solutions, preliminary examination of special population groups (schoolchildren, factory workers etc.) for the purpose of referring cases in need of treatment to qualified dentists, maintenance of liaison with local public health nursing services to ensure that treatment is effectively followed up.

In countries using dental hygienists, the length of training varies from two to four years, but it might well be reduced to one calendar year in countries introducing this type of personnel for the first time. The curriculum should include the elements of anatomy and physiology with emphasis on the oral cavity, macroscopic and microscopic study of the teeth and their supporting structures, causation, prevention and treatment of dental caries, the clinical practice of oral prophylaxis and instruction of the patient in home care and dental health principles, a brief study of the most common diseases of the oral cavity and their prevention, dental health education methods and materials used in schools, health centres and private practice, records and follow-up procedures and finally professional ethics and jurisprudence.

Another type of auxiliary personnel which has been used successfully for many years in some countries is the *school dental nurse* who works exclusively in the public health team and is trained specifically to deal with children of school or pre-school age. She is generally required to supervise and maintain the dental health of about 500 children, each of whom is examined about every six months. She instructs the children in oral hygiene and in addition to preventive work similar to that of the dental hygienist, she fills and extracts teeth (under local anaesthesia). Dental conditions beyond her scope are referred to a dentist. The school dental nurse requires a minimum of two years' training and in addition to learning specific operative techniques, she should be instructed in modern teaching methods and the art of public speaking so that she may teach oral hygiene and preventive measures to school classes, teachers, parent-teacher associations and

HYPERTENSION AND CORONARY HEART DISEASE*

One of the far reaching recommendations made by the Eleventh World Health Assembly when it met last year was that WHO should step up its efforts to stimulate and co-ordinate research in a number of fields of medicine including such world wide problems as cancer and heart disease. A programme along these lines was recently elaborated by the Executive Board at its twenty third session (see Chronicle for March). In the meantime WHO had already called together an Expert Committee on Cardiovascular Diseases and Hypertension to discuss the public health aspects of cardiovascular disease to consider the classification of the various forms of hypertension and coronary heart disease and to suggest criteria for diagnosis to be used in epidemiological studies.

Preliminary considerations

Although the Committee had agreed that of the various cardiovascular diseases hypertension and coronary heart disease are most in need of epidemiological study at the present time the public health importance of certain other cardiovascular diseases is briefly discussed in the opening pages of the report.

The comparative importance of congenital cardiac defects is greatest in countries where infant mortality is lowest. On the other hand it is in the less developed countries that environmental factors affecting the mother are likely to play the biggest role in the causation of congenital defects. Unfortunately the incidence in many of these countries is unknown. More precise incidence figures

would throw considerable light on the significance of environmental factors. As yet maternal rubella is the only such factor that has been definitely proved to be concerned in the production of congenital defects. Consequently effective preventive measures cannot be proposed.

A decade or so ago syphilis was one of the more important causes of cardiovascular disease but the advent of penicillin has changed the picture completely. Mortality statistics show that there has been a great decrease in the number of deaths recorded as due to syphilitic cardiovascular disease and the public health problem now centres on prevention through early case finding, tracing of contacts and prompt treatment of all persons with early infections. The report therefore stresses the importance of ensuring that adequate supplies of penicillin are available in all parts of the world.

The public health importance of pulmonary heart disease (cor pulmonale) varies widely in different countries. These variations are presumably related to differences in the prevalence of chronic bronchitis and bronchial asthma, the common forerunners of emphysema. The prevention of pulmonary heart disease is dependent on the prevention of the underlying respiratory disease. There is a need for more research into the causes of chronic pulmonary disease but meanwhile increased efforts should be made to eliminate or reduce atmospheric pollution and dust hazards and to prevent occupational respiratory diseases such as silicosis, coal workers' disease, byssinosis and beryllium poisoning.

Another important cause of heart disease is rheumatic fever which is still a major public health problem all over the world. Penicillin prophylaxis of relapses of rheumatic fever has been recommended by the WHO Expert Committee on Rheumatic Diseases.

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Dr es USA Pr ence J peranal L SRJus Chairman
Dr C Terson hor The Secret ria vious ted F Dr A L
B vo WIO Dr Tr D her USA [Con Itz] M J
N ven WIO Dr TS S WIO (Secretary)

1. *Id.* 114 Ore. *Arch. R. & S.* 1957 126. See also CH on
note 1957 11 150.

services will be able to cover a much larger proportion of the population. However more attention should be paid also to research in preventive dentistry to the necessity for adequate evaluation of preventive dentistry methods and to research in educational methods.

Programme for countries with little or no dental services

Certain general recommendations are made but it will be necessary for each country through its experts or with the help of foreign or international organizations to adapt them to its own special needs. In general the government of a country should take responsibility for the application of the programme and to this end create a dental health division within its health department and provide as much as possible of the necessary finances when the services have reached a certain phase of development various systems of payment could be introduced in accordance with the pattern for provision of health services in each country.

The programme must always be sufficiently flexible to allow for subsequent modification and extension. At least two categories of personnel must be provided for i.e. dental licentiates and dental aides. One or more of the country's recognized educational institutions should undertake the training of this personnel awarding the appropriate diplomas or certificates. Great care should be taken to select suitable persons as they will have to form the nucleus of the future dental profession.

In many regions where services are in their early stages *dental licentiates* will of necessity act in the place of fully qualified dental practitioners. They must therefore be given technical training that will enable them to exercise their functions under remote supervision and control if necessary. Candidates should have sufficient basic education to enable them to assimilate the necessary instruction and the training period should be not less than two years. During the first year the course should cover instruction in the basic medical sciences as related to dentistry dental anatomy materials used in

dentistry practice in operative procedures on dental models basic principles of oral hygiene and prevention of dental disease etc. In the second year the emphasis should be on clinical work with patients but special aspects of public health health education the history of dentistry and professional ethics should also be included.

The second category of personnel—*dental aides*—may have to be used in certain cases to carry out elementary dental treatment until a sufficient number of dental licentiates can be trained. As their main function will be the extraction of teeth for the relief of pain their course of training should include practical methods of sterilization the use of drugs for the relief of pain and the control of infection and the recognition of potentially dangerous conditions which require the services of a more highly qualified person. They should receive four to six months formal training followed by at least six months practical training under direct and constant supervision.

Implementation of programmes

It is essential that every programme for the organization of dental services should be integrated into the general health organization of the country. It is therefore proposed that dental activities within the Ministry of Health should be directed by a dental officer who—together with all those holding key posts in the programme—should be carefully selected. The extent of dental morbidity should be determined and organizational and methodological problems solved before the programme begins. During the planning phase the following factors should be taken into account: time availability of personnel equipment and funds co-operation with international organizations and the possibilities of expanding the programme in the future. The government should take an active part making the programme as widely known as possible through an appropriate health education campaign. The organization of the work should be in the hands of competent staff who will carefully select capable teachers to undertake the training of personnel.

many years owing to the long incubation period of coronary heart disease

Criteria for diagnosis

The above considerations make it clear that one of the first essentials is to establish uniform criteria for the diagnosis of coronary heart disease and hypertension and the report contains a number of suggestions for minimal diagnostic criteria to be used in epidemiological studies and for the classification of the various forms of coronary heart disease and hypertension. Workers in the field are invited to send in their suggestions and criticisms for embodiment in further revised versions of these criteria.

Hypertension

It is now recognized that no sharp line of demarcation can be drawn between normotensive and hypertensive persons, the blood pressures being distributed continuously throughout the population. However, at either end of the distribution curves there are reasonably homogeneous groups and the report suggests that for statistical purposes in field studies 140/90 mm Hg should be regarded as the upper limit of the normal range while all blood pressures above 160/95 should be regarded as definitely in the hypertensive range. This does not imply, however, that these limits are of any significance as far as the individual is concerned. The report also contains a number of recommendations regarding the technique that should be employed in taking blood pressure measurements in order to ensure dependable and comparable readings.

In classifying hypertension a distinction must be made between hypertension associated with other diseases and essential hypertension for which no specific cause can be found. The report lists a number of diseases that give rise to purely systolic hypertension and others that are associated with diastolic hypertension. In most cases accompanied by systolic hypertension as well. Essential hypertension may be further subdivided into complicated and uncomplicated. In the former case clinical

ophthalmoscopic X-ray electrocardiographic or laboratory studies reveal evidence of cardiac hypertrophy and/or vascular involvement of the brain, retinae, kidneys or heart. "Malignant hypertension" is defined as a severe and rapidly progressive form of essential hypertension. The report urges that all persons found to be hypertensive in field surveys should be further examined for a specific etiological factor and in order to determine whether or not any cardiovascular changes have taken place.

Coronary heart disease

The Committee recognized four principal manifestations of coronary heart disease and attempted to assess their value as indicators of the occurrence of the disease in population groups. The first of these was angina pectoris which could be subdivided into "definite" angina of effort and "probable" angina of effort. In the case of "definite" angina of effort the pain occurs centrally in the front of the chest at the mid or upper sternal level, radiating to the left arm or both arms, round the chest or into the neck or jaw, whereas in "probable" angina of effort the pain may begin in any of these sites of radiation or above the left nipple and it may pass with further effort. A diagnosis of angina pectoris should not be made if the pain occurs (a) after cessation of effort e.g. in anxiety states, (b) only in relation to meals and posture e.g. in hiatus hernia or (c) in relation to special movements or position e.g. in arthritis or fibrositis nor in the case of a "stabbing" or lancinating pain below the left breast as may also occur in anxiety states.

The report emphasizes the importance of ensuring that the conditions of examination allow good rapport between observer and subject and suggests that where possible observers from different surveys should be checked against each other for "inter-observer variation". The history should preferably be taken by an experienced physician. Failing this it may be taken by a trained interviewer but in this case the diagnosis made should be checked by a physician. Questionnaires completed by the

and by other bodies but the extent to which this recommendation is being followed is unknown. The report again directs the attention of all countries to this important public health measure.

Prophylactic use of penicillin can also prevent many cases of bacterial endocarditis, the majority of which are secondary to valvular heart disease or congenital heart defects. The report calls attention to the need for early diagnosis and treatment to prevent serious valvular damage and recommends that all persons with rheumatic and congenital heart disease should receive penicillin prophylaxis during procedures likely to cause invasion of the blood stream by haemolytic and non haemolytic streptococci.

Epidemiology of hypertension and coronary heart disease

The relative importance of these two diseases is difficult to assess as they are often associated. Together they are responsible for the greater part of the cardiovascular disease and death occurring in adults. There is an urgent need to establish the true frequency of coronary heart disease, hypertension and related conditions. The epidemiological data at present available are inadequate and owing to lack of agreement regarding the clinical concepts and terminology of cardiovascular disease³ data from different countries are not comparable. The Committee recognized the shortcomings of the section of the International Classification of Diseases⁴ relating to diseases of the circulatory system and realized that it is complicated and difficult to apply. Any improvement in the Classification should in time be reflected in more accurate and comparable statistics. The report advocates the speeding up of studies to determine the use being made of the International Classification of Diseases by national offices of vital statistics in allocating causes of death and to compare national customs and nomen-

clature in completing death certificates. An investigation of this type has already been started by the WHO Regional Office for Europe. It is realized however that a long period of re-education of the medical profession would be needed to change existing practices and bring about an improvement in death certification sufficient to result in a substantial improvement in national statistics.

Another source of error in mortality statistics is the recording of more than one disease on the death certificate. The diseases may be inter-related forming a disease complex (e.g. coronary heart disease and hypertension) or they may simply co-exist as for example heart disease and diabetes in the middle-aged (multiple cause tabulation). The report recommends that research should be carried out both on the classification of disease complexes and on multiple cause tabulation.

Difficulties in diagnosis and lack of precise criteria also render the available morbidity data of little value in epidemiological studies. The Committee believed that the only hope of real progress in the epidemiology of hypertension and coronary heart disease lay in field studies. In the case of hypertension the report recommends that community studies should be made throughout the world to determine possible differences in blood pressure distribution in many populations. It is important that an adequate description of the populations should be possible and that the same criteria should be used in all such studies. Field studies on the epidemiology of coronary heart disease are already under way in several countries but there is considerable scope for expansion of these studies both in developed and in less developed countries which may offer special situations and opportunities. Particular stress is laid on the value of prevalence studies and direct incidence studies among different groups for example comparisons between smokers and non smokers, between sedentary workers and physically active workers or between people on different diets. The report points out however that such incidence studies must inevitably be continued over

See Ch. III 1958 12 398
World Health Organization (1957) *M* 1 *f* *sh* 1 *1*
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studies pointing out that their clinical usefulness is not a sufficient recommendation for their use in epidemiological studies

Etiology of coronary heart disease

Although recent studies have clarified the effects of the saturated and unsaturated fatty acids on the blood lipids the significance of these findings in relation to coronary heart disease in man has not yet been established. It is therefore considered too early to make any general recommendation regarding changes in the fat composition of the diet. More over other ingredients of the diet also need to be studied and carefully controlled clinical trials of the effects of different diets on patients suffering from coronary heart disease are urgently needed. The report recommends that a special study should be made to devise methods of ascertaining individual food intake that are at the same time simple reasonably reliable and comparable special attention being paid to foodstuffs commonly used in population groups where a low prevalence of coronary atherosclerosis has been established.

Attempts are at present being made to correlate blood-cholesterol levels with food intake on the one hand and with the frequency of coronary heart disease on the other. In view of the great importance of such studies from the point of view of possible preventive measures the Committee considered it imperative that the methods used for blood cholesterol determinations should be standardized reliable and at least comparable within known limits—all the more so as wide variations in normal blood cholesterol levels have been found in the same adult age groups in different countries and communities.

There is some evidence suggestive of a correlation between physical activity and the occurrence of coronary atherosclerosis and coronary heart disease but the epidemiolo-

gical studies that have been carried out so far have been concerned with different occupational groups and have not provided a direct demonstration of a relationship between physical activity and coronary heart disease. In fact studies carried out in the United States of America have yielded results at variance with those of similar studies in the United Kingdom. Additional research is also needed on the personal characteristics that prompt people to select different occupations and how these characteristics may be related to the development of coronary heart disease.

With regard to smoking recent evidence is contradictory some studies having shown a marked relationship whereas others have found no connexion. Much work has been carried out on the influence of hormones on blood lipid levels and atheroma formation and on the possible role of hormones in the etiology of coronary heart disease but so far no definite conclusions are possible.

The report further notes that very little work has been done on possible relationships between psychological and psychosocial factors and the occurrence of coronary heart disease.

One of the reasons for this is the difficulty of securing the co-operation of physicians, psychologists and sociologists with the necessary training and experience. The report recommends therefore that efforts should be made to stimulate such co-operation with a view to formulating methods and principles of research in the psychological aspects of the cardiovascular diseases.

In general the report lays great emphasis on the lack of trained and experienced epidemiologists as a major obstacle to the development of field studies on cardiovascular disease. The implementation of a broad training programme on an international basis is thus an urgent need and the report recommends that this matter should be considered one of the first priorities.

subject are considered generally unsatisfactory except for highly selected populations

Acute myocardial infarction is unlikely to be encountered in field surveys but it is considered important to detect persons who have experienced a myocardial infarct. The patient may give a clear history describing a severe chest pain gradual or more often sudden in onset and similar in character to the pain of definite angina of effort. This may have been associated with collapse or other symptoms often severe enough to necessitate prolonged bed rest. If the patient had been admitted to hospital it may be possible to obtain further objective evidence and it was emphasized that the most important signs of myocardial scars are to be found in the electrocardiogram.

Sudden death is sometimes used as an index of the frequency of coronary heart disease. The Committee felt that there is not enough quantitative evidence available at the present time to justify this procedure but that further research on this question would be profitable. It is recommended that except in special studies the term "sudden death" should be used only in the sense of "instantaneous death" that is death occurring within a few minutes. The Committee believed that a useful index should be obtainable if quantitative estimates are made in unselected populations of the proportion of sudden deaths due to coronary heart disease in comparison with those due to other manifestations of cardiovascular disease.

Many clinicians are inclined to label all cases of congestive heart failure in elderly patients as "arteriosclerotic heart disease" unless other conditions are evident. The multiple areas of myocardial fibrosis found at necropsy are regarded as scarred areas due to microscopic infarcts but the Committee felt that this view had not been substantiated and that there are no grounds for the assumption that all cases of heart failure exhibiting so-called diffuse myocardial degeneration are due to coronary heart disease. Consequently chronic heart failure is not considered to be a useful indicator of coronary heart disease.

Methods of diagnosis of coronary heart disease

Of the clinical methods available for the epidemiological study of coronary heart disease the most valuable is electrocardiography. It is objective, it provides a permanent record and properly used it provides more information about the damage to the myocardium than any other procedure. Moreover it can be readily applied to the examination of a large number of people. The report contains a number of recommendations regarding the precautions to be observed and the type of instrument and leads that should be used. It is pointed out that from the epidemiological point of view the value of the electrocardiogram is enhanced if the reading is checked by several observers. It should be interpreted first without reference to the clinical data and then in the light of specific clinical information; the clinical history may reinforce the meaning of possible patterns giving them as much value as very probable patterns. As an aid to the interpretation a list of electrocardiographic criteria is given in the form of an annex to the Committee's report. This shows the patterns to be expected in the various leads in very probable and in possible myocardial infarction and also the effect of an effort test on the electrocardiogram in cases of angina pectoris. The Committee felt, however, that the value and feasibility of effort tests for field studies remains to be determined and that the reports of field teams using these tests should be awaited before recommending any routine application.

With regard to the use of X rays in field studies apart from the technical, financial and safety problems the measurement of small increases in heart size such as are often met in field studies offers methodological difficulties which have not yet been solved. The question of the value of X ray of the aorta in field studies—e.g. for measuring the aortic width or recording classifications—needs special study. The report also recommends the further investigation of other clinical methods adaptable to field

Vector parasite relationships in bilharziasis

The results of laboratory experiments on the susceptibility of snail vectors in Ghana to local strains of *Schistosoma haematobium* have recently been reported by Dr F S McCullough of the WHO Regional Office for Africa (*Bull. Wild Hlth Org.* 1959 20 75). He found that a definite vector parasite compatibility or incompatibility existed in other words that the different strains of the parasite were virtually specific in their ability to develop in one or other vector.

This finding may provide a key to some of the unexplained observations of other research workers in Africa. It may explain why some species of snails have been found to be heavily infected in Nigeria whereas others in the area elsewhere hosts to the same parasite were totally uninfected. It may explain why attempts to infect this or that snail have been here a success there a failure. It may explain why bilharziasis is a serious disease in Egypt a mild disease in British West Africa.

The key is by no means a universal one as Dr McCullough points out a South African snail for example has been found to be susceptible to an Egyptian strain of *S. haematobium*. The inter relationship between snails and parasite strains is thus probably extremely complex depending not only on morphological and biological variation in the snails but also on the existence of parasite strains of varying degrees of compatibility. Dr McCullough concludes that similar experiments performed elsewhere may lead to the accumulation of knowledge on vector parasite relationships throughout Africa and so to a more comprehensive picture of the situation.

Protection against radiations

The report has now been published of a course on the protection of human beings against ionizing radiations which was held at Saclay France by the Paris School of Public Health and the WHO Regional Office for Europe¹. It contains the texts of

the 43 lectures of the course some reproduced in full and some in summarized form. In an introduction Professor L. Bugnard states "protection is not automatically effective it depends upon the co-operation of all concerned and above all on exact knowledge of the dangers and means of protection. It is essential that this knowledge should not remain the exclusive property of a few technicians it must be widely spread and in particular it must be made available to all those who have any administrative authority in regard to the organization of public health and the organization of labour". It is in fact to such persons that the report is addressed.

The programme of the course was divided into three parts: an introduction concerned with explaining the elements of nuclear physics (origin and nature of rays ionizing power absorption and measurement) a part dealing with radiobiology (action on cells tissues and the organism as a whole somatic effects and genetic effects) and a part dealing with protection proper (assessment of occupational hazard and hazards for the general public security standards means of protection general organization of individual and collective security).

Malaria and *Aedes aegypti* eradication in Cuba

Campaigns for the eradication of malaria and urban yellow fever were undertaken by the Cuban Government at the end of February in co-operation with the Pan American Health Organization (PAHO) which acts as the regional organization of WHO in the Western Hemisphere. PAHO has agreed to contribute supplies and equipment to the malaria eradication campaign. A PAHO malariologist and a sanitarian will shortly go to Cuba to help with the preparatory phase they will be joined by other PAHO personnel as operations get under way. With the initiation of the campaign in Cuba all the nations of the Americas where malaria still exists are now committed to its eradication.

While a programme for the eradication of *Aedes aegypti*—the urban vector of yellow

¹ Centre d'études nucléaires de Saclay (1958) *Protection contre les radiations ionisantes*, 5, P. 10, Pergamon Press, France. 200 p.

Notes and News

Hydatid disease and the fox

Hydatid disease is widespread throughout the world and is the source of much loss of food and of a considerable amount of infection in man. It is caused by a tapeworm *Echinococcus* whose natural intermediate hosts are certain domestic and wild animals but sometimes include man. It is now held widely but not universally that there are two different species of *Echinococcus*: *E. granulosus* of practically world wide distribution infesting the dog and related animals; its intermediate hosts herbivorous domestic and wild animals; and *E. multilocularis* found in parts of Europe and Asia in the islands of the Bering Sea and in Alaska; its definitive hosts not only dogs but also foxes and cats; its intermediate hosts field mice and other microtine rodents. The characteristics of the disease caused by each are different: the alveolar type caused by *E. multilocularis* being much more dangerous.

The literature on the role of the fox as a host of *Echinococcus* has been recently reviewed (*Bull. Wild Hlth Org.* 1959 20: 87). In most countries the tapeworm in foxes has been found not to be *E. granulosus* but several cases of infestation with this tapeworm have been reported in Great Britain. In the nineteenth century the European red fox was imported into Australia; the sheep breeding areas of which are now much affected by hydatid disease. M. A. Gemmell, author of the review, carried out an experimental infestation of 16 of these foxes with the Australian strain of *E. granulosus* in order to determine their status as definitive hosts. A few tapeworms became established in some of the foxes but they were retarded in growth and failed to reach sexual maturity even as long as 112 days after infestation. By comparison the tapeworms proliferated in the dogs used as controls and rapidly reached maturity. The conclusion reached

was that the fox is not a definitive host of *E. granulosus*.

What then of the cases reported from Great Britain? They may have been cases of infestation by *E. granulosus* but if so they were to the knowledge of the author of the article the only reported cases of gravid *E. granulosus* in the fox. They may on the other hand have been cases of *E. multilocularis*.

Isolated cases of alveolar hydatid disease have been reported outside the known endemic areas and have been used as an argument by protagonists of the view that there are not two species of *Echinococcus* but only one. But *E. multilocularis* has been found outside the endemic areas in either the intermediate or definitive host or both and its presence explains the occurrence of all but two of the sporadic cases.

These two cases were recorded in Tasmania and New Zealand where there are no foxes and where the usual intermediate hosts of *E. multilocularis* have not been found. How can they be accounted for on the assumption that there are two kinds of *Echinococcus*? One possible answer is that in each instance the infestation was carried in a dog and the parasite having failed to find suitable intermediate hosts has died out; this would explain also why there have been no more cases. Another possible answer is that the cycle of transmission is maintained at a low level in some intermediate host as yet undiscovered. The author of the article believes that there can be no reasonable doubt about the existence of the two species of *Echinococcus* and he puts forward the hypothesis that the cases in Tasmania and New Zealand are not cases of true alveolar disease but of a transitional form between ordinary and alveolar hydatid disease; in other words atypical or pseudo alveolar cases arising from the known pleomorphism of *E. granulosus* in its cystic stage.

People and Places

Podcasts of BCG vaccine

A tour of inspection of approved laboratories producing BCG vaccine is being carried out in the Western Pacific Region by a WHO consultant Dr O. S. E. He will visit laboratories in Manila, Saigon and Taipei producing any technical advice that may be required.

A graduate of the Medical Faculty of the University of H. S. Erik is Chief of the Bacteriological Laboratory at Sahlgrenska Hospital, Gothenburg, Sweden. He is well known internationally for his work on BCG vaccine.

Teaching of physiology in Fiji

With WHO assistance the Central Medical School, Suva, Fiji, has for the past four years been strengthening its staff and developing the training of assistant medical and dental officers for government service in Fiji and adjacent territories. Dr Jen Jo Hui, who has been appointed WHO visiting lecturer in physiology at the school, comes to this post from the National Institute of Health, Bethesda, Md., USA, where he was visiting scientist assigned to the Clinical Pathology Department. Acting Chief of the Microbiology Service. He has also served for two years as medical officer at the WHO Tropical Diseases Research Office in Copenhagen.

WHO lecturer for Cambodian medical school

Since 1953 WHO has been helping the Royal School of Medicine in Phnom Penh, Cambodia, to improve its teaching standards and to extend its facilities for the training of hospital assistants. Dr A. Desnouët, of France, who was recently appointed WHO lecturer in physiology at the school, completed his medical training at the University of Lyon. Before his present appointment he was Assistant in the Physiology Laboratory, Medical Faculty of the University of Paris.

Public health nursing in Singapore

Lately WHO helped to organize a course in public health nursing for the first of Health University of Malaya, Singapore. The course was drawn up by the director of the Joint Board of Public Health Nursing Studies, consisting of members from the University of Malaya, the Government and the City Council, and the syllabus and aims have received recognition from the Royal Society of Health, England. The course is now being extended to cover district nursing.

Miss Dorothy Goodwin, who has been appointed WHO nurse educator at the Institute obtained her certificate in midwifery training from Birmingham Maternity Hospital and her health visitor tutor's certificate from the Royal College of Nursing, London. After holding district nursing appointments in London and Cornwall, Miss Goodwin spent four years at the School of Nursing, University College Hospital, Ibadan, Nigeria, where she introduced public health nursing into the basic curriculum.

Maternal and child health in Ceylon

The WHO-assisted rural health development project at Kalutara, Ceylon, is primarily concerned with the improvement of child care services both at the Kalutara Health Unit Hospital and in the field. Dr Ida J. van Dijk, of the Netherlands, has been appointed Medical Officer in Maternal and Child Health to the project for a period of two years. Educated at the University of Amsterdam and the Netherlands Institute of Preventive Medicine in Leiden, Dr van Dijk worked as a paediatrician in the general hospital and the infants and children's clinics at Semarang, Indonesia, from 1955 to 1958.

Appointment in the Eastern Mediterranean Region

Dr Rashid Jabbar of the United Arab Republic has been appointed WHO public health adviser to the Health Auxiliaries and Sanitarians Institute at Rad Saud Araba. A graduate of the American University Beirut, Dr Jabbar subsequently took postgraduate courses in obstetrics, gynaecology and maternal and child health at a Paris hospital. He has served as Under Secretary of State, Ministry of Health, Syria, and Professor of Public Health, American University Beirut.

A WHO-assisted malaria eradication programme will be undertaken in the United Arab Republic (Province of Egypt) following a pre-eradication survey which should be completed shortly. Dr George D. Georgopoulos of Greece, who has been appointed malariologist to the programme, has had almost thirty years' experience in malaria control and was formerly recently malaria consultant to the Pan American Sanitary Bureau, which serves as the WHO Regional Office for the Americas.

With assistance from WHO and UNICEF, a centre to provide rapid training for auxiliary health personnel was set up at Gondar, Ethiopia, in 1954. It is now attended by more than 100 students and has to date trained 49 health assistants, 8 community nurse-midwives, and 3 sanitarians. Dr Wen-Pin Ch'ang, of China, who recently joined the teaching staff of the Centre, was formerly Professor of the National Taiwan University. He is a graduate of the

fever—has been in operation in Cuba since 1953 it has hitherto been on a small scale owing to lack of funds. Under the new agreement with PAHO it will be greatly expanded. PAHO *Aegypti* experts are already at work in Cuba and the Organization has undertaken to provide additional equipment and insecticide.

Domiciliary and ambulatory medical care

Hospital services are becoming more and more expensive with the result that governments, social insurance institutions and individuals are finding the cost of hospitalization increasingly difficult to cover. There is thus a tendency for ambulatory and domiciliary medical care to take the place of hospital care. Another reason for this tendency is a growing awareness of the emotional difficulties caused by the uprooting of individuals—particularly children and old people—from their families.

The WHO Expert Committee on Organization of Medical Care met in Geneva from 16 to 21 March to discuss the role of hospitals in ambulatory and domiciliary medical care, the term medical care being used in the sense of comprehensive preventive and curative medical services to the individual rather than simply the treatment of illness. The Committee considered the participation of health centres, polyclinics, outpatient departments of general hospitals, industrial medical services, rehabilitation centres etc. in programmes of ambulatory and domiciliary medical service to a community as well as the role of the general practitioner in this field. The problem of co-ordination of activities both at the local level and that of central administration was also examined.

A review of the Committee's work will appear in the Chronicle when its report is published.

World Health Day 1959

World Health Day, observed each year on 7 April, marks the anniversary of the coming

into force of the Constitution of the World Health Organization in 1948. This year's theme was Mental Illness and Mental Health in the World of Today. The occasion was used by national and local health services to stimulate popular interest in this subject which, although of vital and growing concern to countries at all stages of economic development, is little understood by the public generally.

In a message issued in connexion with this year's observance Dr M. G. Candau, Director General of WHO, stated:

After centuries when mentally sick people were regarded simply as lunatics, creatures irrevocably cut off from their fellows who had to be locked up in institutions or even chained in prisons, society is slowly losing its horror of mental disease and is coming to regard it as curable like any other sickness. Psychiatry is now accepted by the public on a par with other major branches of medicine and gone are the days when the mental asylum's main purpose was to protect society by keeping patients indifferently shut away where they could do no harm.

If treatment is begun early enough, between 70% and 80% of mental patients can nowadays be restored to a useful place in society. In some countries the average hospitalization time for patients who go away cured is less than six months.

Parallel with these advances, new knowledge has been gained about those physical ailments which are to some extent caused by psychological factors, and also about certain kinds of unsocial behaviour that are now recognized as manifestations of mental ill health.

The old, hopeless belief that mental disease is wholly predetermined by heredity, and therefore inescapable, has given way, before the evidence that environment may also play an important part, particularly in early childhood. This permits a more optimistic view and underlines the truth that closely knit families and a stable social structure are the best safeguards against the later development of mental health troubles."

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WORLD HEALTH ORGANIZATION

Chang Chun Medical College China and has carried out post graduate public health studies in Japan and the United States

Headquarters appointment

Dr Henry Makower of Poland was recently appointed to the staff of the Division of Commun-

icable Diseases at WHO Headquarters where he will assist in the expansion of the Organization's programmes concerning virus diseases. Prior to his appointment with WHO Dr Makower was Chief of the Virological Department of the Ludwik Hirszfeld Institute for Immunology and Experimental Therapy in Wrocław and Associate Professor in the Wrocław Medical School.

Review of WHO Publications

The Work of WHO 1958 Annual Report of the Director General to the World Health Assembly and to the United Nations (Off Rec Wld Hlth Org No 90) Geneva 1958. 252 pages illustrated. Price 10/\$2.00 or Sw fr 6.— Published in English, French and Spanish.

The year 1958, marking the tenth anniversary of WHO's establishment as a fully fledged specialized agency of the United Nations, provided an opportunity for a reassessment of the Organization's achievements, methods and aims.

In the introduction to his report on the work of WHO in 1958, Dr M. G. Candau, Director General, states that while the remarkable advances in health which started ten years ago still continue, many of the original handicaps nevertheless remain: administrative delays, shortage of trained and

even semi-trained personnel, inadequate environmental sanitation, undeveloped health statistics services, etc. Thus any evaluation of the progress made in 1958—or in the preceding years—must take into account the tasks still to be fulfilled.

Dr Candau illustrates this statement by a brief review of some of the principal regional activities covered by the report, emphasizing in particular the problem of environmental sanitation, which affects not only the so-called underdeveloped countries but the world as a whole, and on which important decisions will be taken this year by the Twelfth World Health Assembly.

As in previous years, the report is in four sections covering general activities, work in the regions, co-operation with other organizations, and WHO-assisted projects. There are sixteen pages of photographs showing the work of WHO in various parts of the world.

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WORLD HEALTH ORGANIZATION

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OCCUPATIONAL HEALTH IN SOUTH EAST ASIA

Industrialization is changing the living conditions of large numbers of people in the South East Asia Region. The total population of the Region is approximately 500 million of whom 2 million are already employed by industrial undertakings and more than 160 million are economically active. Representatives of 15 countries in the Region—Afghanistan, Burma, Ceylon, India, Indonesia, Thailand—took part in a Regional Conference on Industrial and Occupational Health held at Calcutta, India from 24 November to 5 December 1958 under the joint auspices of WHO and ILO. Of the 28 participants 18 were medical officers and the others government and industrial representatives. The Conference was attended by representatives of WHO Headquarters, the WHO Regional Office for South East Asia and observers from the Indian Society for the Study of Industrial Medicine. The article that follows is based on the preliminary report of the Conference.

The countries of South East Asia have many industrial health problems in common. In national health programmes the main emphasis has hitherto been on the most urgent needs such as the control of communicable diseases, environmental sanitation and maternal and child health. The results of this work have been encouraging and of great importance to the industrial population.

Much has already been done to promote and safeguard the health of workers in the Region but occupational health work is nevertheless still in its early stages and its value has not always been appreciated by government authorities and employers. In addition a lack of personnel and other resources has made it difficult to develop this branch of health work adequately. Occupational health legislation is fairly well developed but its application and enforcement have often proved difficult or even impossible because of insufficient funds (especially in smaller undertakings), lack of supervision owing to the shortage of trained personnel and failure of employers to appreciate the problems involved.

Medical treatment facilities are often available for workers in factories on rail

ways, on plantations, in government offices, in irrigation and construction works, in mines and in harbours, etc. As a rule, however, full scale industrial medical services exist in large undertakings only and are conspicuously lacking in the small industrial undertakings which predominate in South East Asia. In India, for example, only 851 undertakings out of a total of 24,456 employ more than 500 workers. The equivalent figures for Indonesia and Burma are 93 out of 9,807 and 19 out of 2,714 respectively.

The shortage of staff for occupational health services in most countries of the Region is scarcely surprising since in some of them it is impossible to obtain enough medical personnel to carry out even the most urgent public health and hospital activities. In addition, physicians are usually more interested in private practice and clinical medicine than in social medicine; only 133 physicians in India, 4 in Ceylon and 10 in Indonesia are fully trained in industrial medicine. Although the subject is included in the undergraduate medical courses at certain universities in India and Afghanistan, postgraduate training in occupational health is available only at the All India Institute of Hygiene and Public Health in Calcutta, India. The only occupational health institutes and laboratories in the Region are in India.

The report may be obtained from the WHO Regional Office for South East Asia, P. M. House, New Delhi, India.

(Calcutta New Delhi Kanpur) Ceylon (Colombo) and Indonesia (Djakarta)

The administration and supervision of occupational health services are largely the concern of the labour authorities. There are at present only eight medical inspectors of factories employed in India, one in Indonesia and one in Ceylon. There are only three industrial health specialists on the staff of a Department of Health in the Region.

Co-ordination between the departments and authorities concerned with occupational health is not always as well developed as it might be. Existing legislation in some countries leads to overlapping of activities between different government departments. The question of collaboration and co-ordination in occupational health matters, both within and outside places of employment, requires more attention.

Organization of occupational health services

The Regional Conference on Industrial and Occupational Health discussed at length the nature of an occupational health service as distinct from a medical service at the place of employment. There was a large measure of agreement on the functions of medical services at places of employment in South East Asia, but there was considerable divergence of opinion as to how many of these functions could properly be included under the term occupational health. It was agreed that occupational health should be considered as including industrial health and that—as recommended in the first report of the Joint WHO/ILO Committee on Occupational Health²—its general aims should be the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment; and

to summarize, the adaptation of work to man and of each man to his job.

It was concluded that such services are clearly the responsibility of the employer and that within the place of employment they should be organized and paid for by him on the other hand the provision of community health services covering workers and their families outside the place of employment is usually a government responsibility.

The Conference concluded that it would be unwise to lay down any rigid formula for the organization of occupational health services. Whatever pattern is adopted, the factors most likely to influence the organizational structure in any particular undertaking would be (a) number of employees, (b) health hazards, (c) nature of industry and (d) location. A small undertaking with major hazards might require a more elaborate service than a large undertaking with minor hazards.

It was agreed that any undertaking employing 1000 or more workers should be considered as a large one and have a full-time industrial physician. In a hazardous industry with a smaller number of employees a full-time physician might also be necessary. In some cases it might be possible for one full-time physician with adequate nursing and auxiliary staff to provide health services for 2000 or even 3000 employees.

For small industries with minor hazards part-time industrial physicians would be adequate, particularly if suitable nursing or first aid arrangements are available and it was suggested that smaller industries could co-operate in providing common part-time services for all their employees. Where this is not possible, owing to the situation or inadequate resources of the undertaking, the necessary facilities might be provided by the community health service. This is particularly desirable since the majority of workers in the Region are employed in small undertakings, often under poor hygienic conditions, unprotected by social insurance schemes and insufficiently supervised. It would be unfair to deny them completely the protection of an occupational health service. In undertakings cut off from community

health services the employer should assume responsibility not only for providing general occupational health facilities at the place of work but also for general preventive and medical care both inside and outside the establishment. This should include care of workers' families.

Employers in agricultural undertakings have exactly the same obligations as employers in any other form of occupation though obviously health services for agricultural workers cannot—and should not—be organized in the same way as those for industrial workers. The Conference did not feel competent for lack of data to lay down principles for health services for agricultural workers but agreed that more attention would have to be given to their health in the future particularly in view of the increasing use of mechanical equipment and of insecticides, pesticides, fertilizers and other toxic materials in agriculture.

The Conference agreed that the functions of occupational health services in South East Asia should be primarily preventive, aimed at the control of physical, chemical, mental, physiological and other factors likely to affect the worker's health. The services should be prepared to deal with non-occupational health problems according to the special needs and circumstances of the areas in which they operate. Thus they might assume responsibility for immunizing workers against typhoid, cholera, small pox, tetanus and other diseases.

They should also be responsible for medical examinations of workers, the rehabilitation of persons incapacitated by industrial accidents or occupational disease and the rehabilitation of handicapped workers in general. Special programmes might have to be developed in the Region for the rehabilitation of workers with chronic diseases such as tuberculosis and non-infectious leprosy.

The industrial physician should be in a position to advise the management of the undertaking on general problems relating to workers' health such as nutrition, housing, the disposal of industrial wastes and the prevention of air pollution.

It was emphasized that a number of diseases

not usually recognized as occupational might have a higher incidence among workers than among the general population. This is a field in which collaboration between occupational and community health services would be particularly useful. Mass examinations for tuberculosis, venereal disease, diabetes, malaria, eye diseases, helminthic diseases and malnutrition are carried out extensively by community health services in the Region and the Conference considered that the facilities available for these examinations should be put at the disposal of occupational health services.

Occupational health institutes

The role of occupational health institutes was discussed at length. While some of the participants felt that such institutes should be independent of government control, it was recognized that at present only governments are in a position to finance them. A useful way of administering an occupational health institute might be through an autonomous governing body consisting of representatives of employers, employees and the government and preferably including also representatives of the medical profession. This body could be assisted by a group of advisers with appropriate technical qualifications and experience. WHO and ILO could help in this connexion.

The tasks of an occupational health institute should be (a) service and research, (b) training and (c) the provision of technical information. For the last of these tasks in particular assistance from international organizations such as ILO and WHO would be desirable.

The institute should preferably be affiliated to a university, a medical school or an institute of public health. Proximity to a medical school, particularly one concerned with post graduate education, would be an advantage because of the availability of advice and assistance from expert clinicians. It would be most useful if occupational health institutes in various South East Asian countries would maintain close contact with each other and evolve programmes of research on common problems.

Collaboration and co-ordination

It was agreed that to get the best results from their work occupational health services should collaborate as closely as possible with the other departments in the undertakings to which they are attached. In larger undertakings consisting of a number of separate departments the status of the occupational health service should be comparable to that of any other department and the industrial physician's status should be equal to that of other departmental heads. Even in a relatively small undertaking which is not clearly divided into a number of departments the occupational health service should be regarded as a separate section with the industrial physician in charge directly responsible to the management.

External agencies with which collaboration is desirable include community health services, social security agencies, labour inspectors, labour institutes, occupational health institutes, medical societies and employers and workers organizations. Collaboration with these agencies on the local level should preferably be entrusted to the industrial physician. It is vital that there should be co-operation also with international agencies such as WHO and ILO.

Education and training

Before suitable training facilities can be devised the needs must be ascertained. This could be done by committees consisting of representatives of the governments, employers and workers organizations, industrial physicians, the nursing profession and faculties of medicine and engineering. Existing training facilities should be utilized as fully as possible and perhaps—with the assistance of international and other agencies—organized on a regional basis. The support of the employers should be sought in selecting suitable persons for training and preference should be given to those already engaged in occupational health work.

Some instruction in occupational health should be included in the general medical curriculum perhaps in the public health and social medicine courses. It might also be advisable for the physiology course to include instruction on such aspects of the subject as work stress and fatigue and during the period of clinical training students should have the opportunity of attending occupational health clinics. Special intensive field training courses might be arranged for physicians already working in occupational health while a complete university course culminating in a degree or a diploma should be established for those intending to specialize in the subject. Opportunities for physicians to study occupational health work in other countries would also be desirable.

Special training for nurses intending to work in industry was recommended but the Conference recognized that in view of the present shortage of qualified nurses in the Region it might be necessary to have recourse to auxiliary personnel chosen from persons having the necessary intelligence and education and already engaged in occupational health work. The training of auxiliary personnel would be primarily the responsibility of the industrial health physician but it would also be desirable to provide a separate intensive course lasting about three months in a suitable institute. In planning the course it should be remembered that owing to the shortage of physicians auxiliary personnel might have to work without much supervision.

The Conference considered that it was also important to provide information on occupational health to engineers, students of various trades, factory inspectors, employers, supervisors, workers and social welfare officers. Finally it was agreed that health education should be one of the main elements in the development of an occupational health programme. This should be a responsibility of all members of the health team and the active participation of both management and workers should be enlisted.

CLASSIFICATION OF CARDIOVASCULAR DISEASES

Cardiovascular disease has been the focus of increasing attention particularly in the more developed countries of Europe and America in proportion as its incidence has gone up and that of other diseases has gone down. In the International Statistical Classification of Diseases, Injuries and Causes of Death most cardiovascular diseases are classified under diseases of the circulatory system where they are sub-divided into rheumatic heart disease, arteriosclerotic and degenerative heart disease and hypertension and hypertensive heart disease. But other cardiovascular diseases are classified as syphilitic cardiovascular affections, congenital malformations of the circulatory system and psychogenic disorders of the circulatory system. Vascular lesions of the central nervous system, whether due to arteriosclerosis or to hypertension, are classified under diseases of the nervous system and sense organs.

The criticism levelled against this classification of cardiovascular diseases is that it is complicated and results in statistics that are difficult to interpret and not comparable. One reply to this criticism is that the present classification reflects the complexity of cardiovascular disease itself which can be viewed and classified—from a number of standpoints. In fact it provides an admirable illustration of a problem which arose at the

Second International Statistical Congress in 1855 and has been debated ever since: *ie* should diseases be classified by etiology by anatomical site according to some other criterion or according to a combination of criteria? If etiology were the sole point of interest in cardiovascular disease, deaths would be classified in most cases under hypertension, arteriosclerosis or rheumatic fever. But the anatomical site (the heart, the brain or the kidney) may be of equal or even greater interest and the classification recognizes this by providing suitable categories: for example, hypertension accompanied by hypertrophy of the heart may be classified under "Other and unspecified hypertensive heart disease," a title which caters for both etiology and site of involvement.

Not all categories in the cardiovascular section, however, are so accommodating: etiology is often sacrificed to anatomical site if this is of greater significance. For instance, cerebral haemorrhage due to arteriosclerosis is classified simply as cerebral haemorrhage, a category which ignores etiology. Moreover, if the coronary arteries are involved, hypertension with hypertrophy of the heart may not be classified as in the example given above but under heart disease specified as involving coronary arteries; the etiology, *ie* the hypertension stated on the death certificate, being passed over.

There is therefore justification for the criticism that the present classification of cardiovascular diseases does not always

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The Committee noted the study begun by the WHO Regional Office for Europe of existing practice in various European countries with regard to death certification in cases of cardiovascular disease. It agreed that a long period of postgraduate education of the medical profession is required before improved certification can lead to any substantial improvement in national statistics. Pending such improvement comparative studies based on clinical and post mortem records should be undertaken to gauge how far certificates are correct and to assess the real incidence of morbidity conditions leading to cardiovascular disease and death. Until results of such studies are received existing international tabulations of morbidity from cardiovascular diseases would improve in usefulness if accompanied by comments on their quality and on the methods used to correct and classify them.

A WHO Expert Committee on Health Statistics which met in September and October 1958² also agreed that a series of basic clinical and statistical studies would be necessary before a revision of the cardiovascular section of the Classification could be undertaken. Investigations have already

been planned or started in certain countries into such subjects as medical certification of cause of death, the basis of the diagnosis entered on certificates and ways of improving classification.

The Committee recognized the need for early co-ordination of national and international efforts before divergent ideas about the revision of the classification of cardiovascular diseases became firmly fixed. It recommended that a group of health statisticians and of specialists in cardiovascular diseases with an understanding of statistical classification should meet to consider such revision in the light of current medical concepts and statistical requirements.

WHO's task is to follow the methodological studies undertaken in various countries to keep the countries informed of what is being done and to collect, consolidate and analyse results. A document is accordingly being distributed to all national committees on vital and health statistics and other interested agencies setting out the present position and containing the request that WHO be informed of any national or local studies carried out or planned on the clinical and statistical classification of and the coding and tabulation of the mortality and morbidity from cardiovascular diseases.

¹ *Wld Hlth Org. Wkly R. Ser.* 1959, 144. See p. 21 of 30. ² *Member of the Chronicle*.

Alcohol, tobacco and cardiovascular disease

The evidence that alcohol is relevant to cardiovascular disease comes largely from clinical studies. Areas where consumption is high may have quite low reported mortality rates from ischaemic heart disease whereas they seem to have an excessive death-rate from other cardiovascular and renal diseases. This is particularly evident in a number of countries among persons whose occupations are associated with a high alcohol consumption such as bartenders.

Two independent large-scale studies on the role of tobacco in cancer of the lung state as an incidental finding that heavy smokers have higher death rates from coronary thrombosis. Excessive smoking and drinking may both be expressions of emotional disturbances but whatever the mechanism, the relationship of heavy smoking to cardiovascular disease very much merited further study.

From the report of Study Group on Atherosclerosis and Ischaemic Heart Disease. *Wld Hlth Org. Techn. Rep. Ser.* 1957, 817.

incorporate all the useful information that is contained in the death certificate. But the shortcomings in statistics of cardiovascular diseases can only partly be attributed to the classification. Other factors are equally important. Among them may be included the manner in which clinical observations are summarized and presented on the death certificate and elsewhere, the form of the present international medical certificate of cause of death which may be unsuitable for the recording of complex disease states, difficulties in the medical terminology used to describe a particular morbid condition and finally the quality and reliability of the diagnoses made by physicians.

Greater clarity in the clinical classification of cardiovascular diseases could not fail to benefit a statistical classification which takes into account current clinical opinion and is periodically revised to keep abreast of advances in medical knowledge. From this point of view the situation would be improved if the criteria required for the diagnosis of cardiovascular disease were defined, if the relationship between the various manifestations of the disease were elucidated, if the aspects of primary interest from the clinical or preventive point of view were brought out, and if the degree of detail with which the manifestations of the disease should be differentiated were indicated.

How the International Statistical Classification would be affected can be shown by the example of malignant hypertension. This disease is classified as essential malignant hypertension, or if the heart is involved as essential malignant hypertensive heart disease. It is considered to be a condition of special interest and provision is made in the Classification to preserve its identity as much as possible when it is combined with other manifestations of cardiovascular disease. For example, malignant hypertension with nephrosclerosis is classified under malignant hypertension and not under arteriolar nephrosclerosis.

If it is shown that malignant hypertension is not a separate clinical entity but differs from benign hypertension only in degree, the question arises whether the preservation of

the distinction between these conditions in the International Classification would still be warranted. It might still be regarded as desirable to maintain the concept of malignancy in order to indicate the seriousness of the condition and its grave prognosis. Even this concept however may lose significance if as is claimed, anti-hypertensive drugs can substantially improve malignant hypertension.

A different kind of problem is posed by the association of coronary disease with other diseases. Coronary disease takes precedence not only over less precise diagnoses such as myocardial degeneration or functional heart disease but also over the whole group of hypertensive diseases. Consequently the fact that coronary disease began with hypertension would not be apparent from single cause tabulations. If this etiological aspect of coronary disease is of sufficient importance the International Classification should provide for the incorporation of hypertension into the title covering coronary disease.

These are the kind of problems encountered in the classification of cardiovascular diseases. WHO keeps in close touch with developments in these diseases because of their great importance to world health and it seeks to clarify the present situation because it is responsible for the International Classification and because any improvement in the Classification leads to increased comparability and contributes to the understanding of the disease concerned. A WHO Expert Committee on Cardiovascular Diseases and Hypertension which met in October 1958 was aware of the shortcomings of the section on cardiovascular disease in the Classification but realized that its inadequacy reflected present day disagreement about clinical concepts and terminology. The application of uniform diagnostic criteria would improve the quality and homogeneity of diagnosis but even so the Classification would have to provide categories for the vague terms still often found on death certificates particularly in the case of the aged.

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With the gradual regression of the disease the significance of seroreactors changes instead of indicating the extent of infection during the past 30-50 years they indicate the increasing number of susceptible individuals. The attitude of the health authorities also changes instead of seeking to render early cases non-infectious they look for the sources of infection of the few early cases that may be expected to occur for several years after yaws has ceased to be a public health problem. The established rural health services must carry out this surveillance work and in some countries may therefore have to be expanded. At what stage should such surveillance take the place of surveys? It has been suggested that a suitable time would be when a survey of 80% of the population reveals less than 2% of clinically active and less than 0.5% of infectious cases.

The most likely sources of isolated infections are missed cases, delayed relapses in untreated early latent cases and new cases

introduced from outside. Active or latent early cases that have received the doses of PAM recommended by WHO¹ rarely relapse. Infection is possible from late lesions but infectiousness is not high. Survival of the treponemes outside the human body has yet to be demonstrated. Introduction of new cases from an area where transmission is still active is a possibility and has been shown to occur between northern and southern Togo. Prompt recognition and treatment is imperative for these cases but improved living standards and the virtual disappearance of the conditions favouring transmission should ensure that the arrival of one or two infectious patients does not start an outbreak.

The paper—prepared by WHO²—on which this article is based concludes by stressing the danger of venereal syphilis spreading into the rural areas when yaws has disappeared and no longer affords protection against syphilis.

Bull. Wld Hlth Org. 1956 15 869

Unpublished working document INT/VDT/116

International standards for drinking water

WHO has been concerned for some time with the standardization of methods for controlling the quality of drinking water. In 1953 the Organization sent Member States a questionnaire concerning the methods officially used in their respective countries. A study group examined the replies and finally established the approved methods which are described in this volume sometimes in very great detail.

WHO is to be highly congratulated on this remarkable work prepared by its specialists, who have very carefully codified the classic methods. It is extremely important to be able to compare the views of technicians from different countries and one of the great merits of this volume is that it makes this possible. The French reader for example will be surprised at the amount of attention given to determination of the plankton content and by the absence of references to bacteriophage standards, an aspect of the subject with which French technicians are more familiar.

Hygienists will be extremely interested in the first part of this work and technicians—whether chemists, physicists, bacteriologists or biologists—will read the second part with profit. It is to be hoped that this publication will act as a stimulus to fresh research and lead to further progress in this field.

La Presse Médicale 1959 Vol. 67 p. 533

YAWS A DISEASE IN REGRESSION

A communicable disease may spread throughout an area from one or more foci and then gradually recede even without effective treatment until it is again confined to a few foci or even disappears. Trachoma for example was brought into Europe by Napoleon's army on its return from Egypt and ravaged the entire continent but it has now practically disappeared from most European countries. Yaws has similarly almost disappeared from Ceylon where in 1916-1920 there were 30 000 to 35 000 people with yaws lesions attending the outpatient departments of hospitals every year.

Yaws indeed is a good example of a disease in regression. In the earlier decades of this century its prevalence in those countries where it occurs was high and patients in the early stage displayed many lesions. This is no longer so. In half of the 400 million people at risk in the world this is due to the mass treatment of the population with long acting procaine penicillin in oil with 2% aluminium monostearate (PAM). But in the other half the prevalence of the disease is now low although no mass treatment has been given. There are few clinically active cases and the number of seroreactors may be large or small depending on how recent the decline in the transmission of the disease has been. When transmission has ceased no cases of clinically active yaws occur but seroreactors are found among adults though not among children.

Another characteristic of the disease in its regressive phase is its reduced severity not only are clinically active lesions few but the papillomatous stage is distinguished by the sparsity of papillomata in even the most heavily affected patients and those papillomata that do exist are usually dry whereas previously they would in most cases have had an abundant infectious exudate.

Yaws may be found in regression in communities where treatment has been available for many years to those seeking it.

But the regression appears to be more general than could be accounted for by such unsystematic treatment and most campaigns before 1950—when the Government of Haiti launched one with WHO UNICEF and PASB assistance—were on too small a scale to have any lasting effect. In places where yaws was hyperendemic the people were poor ill clothed ill fed unwashed with scarred dry skins covered with ulcers. This is still true of the foci of high prevalence which remain in certain isolated areas. Where yaws is regressing they are better clothed better fed more prosperous looking with clean glossy skins. These areas of regression are associated with improved economic and social conditions and often with proximity to main roads.

How can the regression of yaws be accelerated? A survey of the population at risk must be carried out in order to assess the extent and clinical pattern of the disease. Treatment will then depend on the numbers affected. If they are few or if the population is scattered total mass treatment is probably the most economical form. If they are many juvenile mass treatment should be used when the clinical prevalence is 5-10% selective mass treatment when it is 2-5%. If it is under 2% possibly all that is required is for PAM to be made available at rural dispensaries or elsewhere and for some simple surveillance system to be established.

In juvenile mass treatment adults with clinically active lesions are given 4 ml of PAM and children under 15 years of age with clinically active lesions 2 ml while all other children under 15 receive 1 ml. Children are protected because they are the most likely to have latent early infection and are thus most liable to have infectious relapses or to be incubating the disease. In selective mass treatment all clinically active cases are treated and half doses according to age are given to close contacts. Measures to improve the economic and social condi-

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¹ World Health Organization (1958) *Interim standards for drinking water*. Geneva. Price £1 \$4.00 or Sfr 12.—(cl. hbo. ed.).

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encephalitis particularly in the age groups 10-39 years. This may be due to a greater occupational exposure to the vector mosquito. About 52% of cases of western equine encephalitis occur in children of less than one year of age whereas under 1% of cases of St Louis encephalitis occur in this age group. The reason for this is unknown.

Most proven cases of western equine and St Louis encephalitis occur in the Central Valley of California which is warm and well irrigated and provides a suitable habitat for the vector mosquito *Culex tarsalis*. When cases occur outside this endemic area it has usually been found that exposure took place in the Valley. Western equine and St Louis viruses have been isolated from *C. tarsalis* in nearly every instance before human cases occurred. Data on encephalitis in horses are regularly submitted by veterinary officials but do not provide much information of value since serological tests on horses are difficult to interpret because of the widespread vaccination of horses against western equine encephalitis. There is no proof that the St Louis virus produces any clinically identifiable disease in horses although serological tests appear to indicate that infection is present.

After the 1952 epidemic a surveillance programme was started four areas being specially selected for observation. Various methods were used to try to predict the future incidence of the disease. One method was close observation of all hospital cases of fever combined with disturbances of the central nervous system the object being to detect early any increase in the number of cases. Another with the same object was the enumeration of all positive laboratory specimens sent to the Laboratory of Viral and Rickettsial Diseases of the State Public Health Department to be tested for encephalitis and others were estimation of mosquito density and population and weekly examination of a sample to determine to what extent they were carrying the virus. The results so far have not been very conclusive nor has it been possible to establish any relationship as yet between mosquito infection rates or population and the incidence

of human cases. It is likely that other factors are concerned weather conditions and temperature perhaps or the degree of immunity in the population. These possibilities are now under study.

No causative agent has been found in the specimens taken from 20% to 50% of clinical cases of encephalitis and these cases are classified as encephalitis of indeterminate origin. If they are not due to the virus of western equine encephalitis or of St Louis encephalitis what is the causative agent? This question is being studied at the Laboratory of Viral and Rickettsial Diseases. There would appear to be room for improvement in laboratory diagnostic tests. The skin test which has been tried with some success in California and would if proved reliable help assess the proportion of the population susceptible to the virus and measure the changes caused by sub-clinical infections also deserves further investigation. This test may indeed be easier to carry out and prove to be more practical than the neutralization test at present in use to prove previous contact with arthropod borne viruses. Other problems under study are the question of a natural reservoir of the virus—in wild birds or animals for example or perhaps even horses and the sequelae of encephalitis—a field of great interest for children with proven western equine encephalitis can be watched as they grow up for permanent changes neurological or other.

Treatment is not very encouraging. No drugs are known to influence the disease and treatment is therefore purely supportive. Control so far is based on reduction of the density of the *C. tarsalis* population and about US\$ 4 000 000 are allotted annually for this purpose. In spite of all efforts however a considerable mosquito population still remains. The human host can be protected by repellents mosquito nets mosquito proof doors and the like or an attempt may be made to give him artificial immunity but although a suitable vaccine against western equine encephalitis exists for horses none has so far been developed for human beings. Moreover it is difficult to decide who should be vaccinated whether vaccina

ENCEPHALITIS IN CALIFORNIA

WHO has co-ordinated and encouraged studies of encephalitis on the ground that only by the pooling of international knowledge can its etiology and epidemiology be elucidated. A collection of articles on an outbreak of virus meningo-encephalitis in Europe in 1953 was published in the WHO Bulletin in 1955². They describe a disease only recently recognized in central Europe though it may well have been present for many years. The outbreak provided an opportunity for an international study of the disease in which workers from Austria, the Netherlands, the United States, and Yugoslavia took part. In Slovenia an organism isolated from the blood of a patient diagnosed clinically as having encephalitis caused illness and death in white mice and the antigen prepared from infected brains of mice fixed complement with sera from typical cases.

The disease showed seasonal periodicity in Austria, occurring in the summer months and disappearing in the winter, and a history of bites by ticks or mosquitos was recorded in most instances. The virus isolated was shown to be the same as, or closely related to, those of Russian spring summer encephalitis, Czech encephalitis, and louping-ill, a disease of sheep. An Advisory Group convened by the WHO Regional Office for Europe in April 1958 estimated that the incidence of the disease might exceed 20 per 100,000 in some years in the endemic areas of Europe.

Encephalitis is also of much topical interest in the Americas where in the recent past new varieties have been discovered. The Pan American Sanitary Bureau (PASB), which acts as the WHO Regional Office for the Americas, also encourages study of the disease and it published a study of encephalitis in California in a recent number of its Bulletin³.

Of the various varieties of encephalitis, two caused by arthropod-borne viruses have been the subject of much investigation in California. These are St. Louis or epidemic encephalitis and western equine encephalitis or encephalomyelitis, the latter having been identified in California as a separate clinical entity.

Acute encephalitis has been a notifiable disease in California since 1919. There was an epidemic in 1952, 805 cases being reported, of which 410 cases were confirmed as being of either St. Louis or western equine encephalitis. Since then only in 1954 have more than 100 cases of arthropod-borne virus encephalitis been notified in any year, although in every year since 1952 there have been more than 350 suspected cases of encephalitis; there were less than 50 cases due to St. Louis or western equine viruses in four out of the five years 1953-1957, and there were only 9 in 1955. Virus encephalitis is clearly therefore more a potential than an actual danger; there are few cases but there is always the possibility of an epidemic.

The seasonal distribution of virus encephalitis follows a fairly uniform pattern from year to year. The first cases of western equine encephalitis occur in June and are followed by cases of both western equine and St. Louis encephalitis in July, August, and September; the St. Louis form predominates in September and occurs almost alone in October. After this there are no more virus cases till the following year. In the past five years this time lag of one month by the St. Louis form has not been so clear-cut as formerly. Post-infective encephalitis, on the other hand, is notified throughout the year and cases of mumps encephalitis and encephalitis of indeterminate origin exceed in number those of the arthropod-borne type.

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Many causes of death are reported more frequently from the urban than from the rural areas. This may be because the disease is commoner in the towns or is usually diagnosed or treated in the hospitals which as a rule are in the towns but often the reason is that the cause of death is misdiagnosed or undiagnosed and death is attributed to what is only a symptom or else the diagnostic term is not used or understood or has no vernacular equivalent. Of the diagnoses in 1956 of benign and unspecified neoplasms for example or of hyperplasia of the prostate 90% or more were made in the urban areas on the other hand 90% or more of diagnoses of cases of rheumatic fever drowsy and pyrexia were made in the rural areas. These percentages look inherently improbable as reflections of the actual state of affairs and closer scrutiny reveals the shaky foundations on which they are built. To take rheumatic fever as an example 1111 deaths were attributed to this cause in 1956 1057 of them from rural areas. But of the rural deaths 868 were of persons over 45 years of age and 417 of these were over 75. The Sinhalese term usually used for the condition and translated as rheumatic fever applies to any painful swelling of the joints and would therefore apply not only to rheumatoid arthritis but also to gonococcal tuberculous or traumatic lesions.

Another illustration of the difficulties that may arise in certification is furnished by

typhoid fever. Available epidemiological evidence would suggest that it is commoner in rural Ceylon than in the urban areas. Nevertheless of the 309 deaths registered in 1956 as due to typhoid fever 217 (70.2%) were registered in urban areas. Suspected cases wherever they are are of course sent by the health services to hospital but those individuals who for one reason and another die from typhoid fever in the rural areas are probably seldom regarded as cases and the usual Sinhalese term for the disease—meaning probably no more than continued fever—is coded as pyrexia of unknown origin when it appears on a death certificate. This helps explain the discrepancy between the figures for rural and urban areas.

Many of these difficulties could be overcome by reorganization of the system and introduction of the international form of death certificate for—Dr Padley points out—far less is recorded about the medical causes of death than is known to the doctor who treated the patient. Lay statements based on terms derived from *ayurveda* an ancient system of medicine which relies on the authority of scripture and lacks a tradition of continuous experiment present a more intractable problem. Much could be done however by keeping the translations and terms used under constant scrutiny and by preparing a set of simple instructions for the lay registrars on the priorities to use in selecting the symptoms to report following interrogation of the relatives notifying the death.

New species of mosquito

A new species of mosquito identified by members of a WHO malaria advisory team in Cambodia has been named *Anopheles pampana* in honour of Dr Emilio Pampana, former Director of the Division of Malaria Eradication at WHO Headquarters. *A. pampana* is closely related to *A. minimus* and has hitherto been regarded as a variation of that species. The morphological characteristics of both adults and larvae are however distinct enough to separate it from the *A. minimus* complex.

Baker, W. G. G. & Beales, P. F. (1959). *Ann. Entomol. Soc. Amer.* 52: 63.

tion should be repeated annually and whether given the small number of cases the cost and administration of a vaccine can be justified particularly as its administration in California would be complicated by the presence of many immigrant workers during the encephalitis season. There would also have to be two vaccines one against western

equine and one against St Louis encephalitis. If there was a vaccine which could be used against western equine encephalitis a policy of selective immunization could perhaps be practised pregnant women for example or new born children could be vaccinated so as to reduce the high incidence in children under one.

DEATH CERTIFICATION IN CEYLON

The system of recording births and deaths in Ceylon instituted in 1867 and improved at the end of the nineteenth century is of a high standard. Statistics of causes of death are by no means so good nor indeed can they reasonably be expected to be until each death is certified by a qualified medical practitioner. Some examples of the difficulties of death certification in Ceylon are given in an article by Dr Richard Padley WHO Statistician in Ceylon which is due to appear in a forthcoming number of the *Bulletin of the World Health Organization*.

In most urban areas death is reported by the medical practitioner who attended the patient in his last illness. On estates (tea rubber and the like) which are specified areas subject to certain legislative enactments the superintendent is responsible for reporting deaths to lay registrars through the nearest medical officer or apothecary appointed under the Medical Warrants Ordinance. The medical check of the diagnoses however is often of the most cursory nature. In other areas lay registrars record deaths and their causes and the village headman is required to report any death to the registrars. Sudden deaths are investigated by an enquirer into deaths.

The relatively higher proportion of deaths registered in urban areas is largely due to the fact that these areas include most of the country's hospitals. The death certificate in current use in hospitals is not the WHO international form and has space only for a single entry for the cause of death. Except in the larger hospitals too the certificate is completed by an apothecary on the staff who

has no first hand knowledge of the case but depends solely on the hospital records. Only private medical practitioners are required to use a form approximating to the international form of certificate of cause of death.

Lay registrars are frequently literate only in their own language and script. Since they report deaths in the rural areas which accounted for over 58% of all deaths in 1956 and for the estates which accounted for 12.7% their reports cover the greater part of the population. As is to be expected of lay reports many record symptoms only as the cause of death but a disturbingly large number of reports of this kind are submitted also in urban areas where certification is mostly done by medical practitioners. A typical example of such a diagnosis is *rathe* a popular term meaning redness which is loosely applied to a variety of erythematous conditions chiefly in children under one year and may be totally unrelated to the disease. Another *mandama* which means wasting covers a variety of nutritional deficiency states. These two diagnoses in 1956 accounted for 7.2% of all deaths and 12.2% of all infant deaths. Pneumonia is another prominent diagnosis to such an extent that it prompts the thought that often it may only be a terminal condition and if the international form of death certification were used its frequency would diminish dramatically. Over 13% of all deaths in 1956 were attributed to senility as the sole cause of death. Nephritis is another common diagnosis which probably means no more than that the terminal condition of the patient was characterized by oedema.

They are also made use of by various countries to compare their progress in health with that achieved by similar health action elsewhere. Because of these national requirements international agencies have the unique responsibility of collecting and promptly disseminating statistical information on a world wide basis.

However from the international point of view while the special needs of individual nations are still paramount the problem is not confined merely to collection and dissemination of information. International co-operation has to be secured so that national health statistical services will produce data in a form that is not only useful to themselves but to the world at large. Moreover certain health problems affecting groups of countries have to be studied statistically from an international standpoint. Statistics are also important in connexion with the help given by WHO to various countries in the implementation of their health programmes and the introduction of modern techniques in health work. For instance with the assistance of UNICEF and in collaboration with other bilateral and international co-operation agencies WHO has undertaken large-scale campaigns against several communicable diseases—malaria, yaws, trachoma, etc. The treatment of millions of individuals and the spraying of millions of houses by residual insecticides entail the study of the relevant statistics and their proper interpretation. With the assistance of WHO and UNICEF various other national activities such as maternal and child health services, school health work and dental health are being expanded. The value of this work can be demonstrated only if reliable statistics are maintained and systems for the collection and analysis of the relevant data must be devised.

In 1946 when the Interim Commission of the World Health Organization assumed the functions of its predecessors it became responsible for continuing previous work in international health statistics. The work of the Health Organisation of the League of Nations, the Office International d'Hygiène Publique and the Pan American Sanitary

Bureau had been designed to meet then existing needs in the collection of vital and health statistics, the diffusion of knowledge on quarantinable diseases and the preparation of studies on factors determining the prevalence of disease.

The responsibility for continuing previous work and the constitutional obligation to undertake additional work in the above mentioned fields had an important influence on the preparation of early WHO programmes. The framers of the WHO Constitution had expressed their realization of the shortcomings of the international facilities then existing for the collection of vital and health statistics and for the investigation of hazards to national, regional and international health. Hence the appearance in the Constitution of such functions as the maintenance of epidemiological and statistical services, the control and eradication of communicable diseases, the conduct of research in the field of health and the establishment of international nomenclatures of diseases and causes of death.

Basic data

There are three main categories of basic data in health statistics:

- 1 Data on population size, composition, distribution and growth
- 2 Vital statistics, i.e. statistics on live births, foetal deaths, marriages and divorces, deaths, etc. Of these the statistics relating to live births, deaths and foetal deaths are of particular interest to WHO.
- 3 Health statistics, i.e. numerical information required and produced for and by health agencies.

The Statistical Office of the United Nations has assumed responsibility for seeing that vital statistics and data on population are obtained in sufficient detail and in internationally comparable form from an increasing number of areas. In the light of the above needs, the nature and extent of what WHO is

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958

2 Nature and extent of the problem

This is the second part of an account of WHO's work in international health statistics by Dr H S Gear formerly Assistant Director General Department of Central Technical Services WHO Dr Y Braud Director Division of Health Statistics WHO and Dr S Swaroop Chief Statistician Health Statistical Methodology WHO The first part appeared in the February 1959 Chronicle¹

Introduction

Part I of this account dealt with historical developments in vital and health statistics up to the end of the Second World War. In the post-war years progress in international statistics received fresh momentum with the creation of the United Nations and of WHO its specialized agency for health and it has been further accelerated by the desire of many developing countries to raise their living standards. Before reviewing current developments in vital and health statistics it is well to consider the nature and extent of the problem which has two aspects national and international.

National and international needs in health statistics

By and large the purpose of vital and health statistics is to contribute to social and economic progress. Existing levels of health and demographic problems have to be studied in relation to the conditions and factors that influence them. For this—and for the study of trends and changes in health conditions—factual knowledge is essential. The more advanced a country the more precise and penetrating are the studies it has to undertake. On the other hand a country only just beginning to organize its public health services may do so without waiting for extensive data to be gathered and analysed. For instance such basic steps as

the improvement of environmental sanitation the establishment of maternal and child health services and health education—to name only a few—may well precede a full statistical scrutiny of the situation. Nevertheless even simple kinds of vital and health statistics such as those which help in locating areas of high mortality and indicating the major preventable diseases would be helpful. These can be produced relatively easily either by means of sample surveys or by the establishment of a national health statistics system. But once public health services have been successful in reducing epidemic diseases and death rates the need arises for precise data on the relative importance of various residual causes of sickness and death. Indeed it is on the basis of such careful scrutiny that the importance of accidents in childhood and of degenerative diseases in adult life and old age in advanced countries is now being brought out.

It has been truly said that health is invisible. This is especially apparent when epidemics sweep from one country to another and cover more than one continent. Recent examples are the spread of cholera as far west as Egypt in 1947 the worldwide epidemic of influenza in 1957 and the occasional outbreaks of smallpox generated by infection imported into countries of the west. Each country has therefore to be constantly on the look out for what is happening epidemiologically throughout the world. International health statistics provide the necessary world information system.

used the natural increase method in 1955. The situation varies of course from region to region and it changes also with time. With the taking of more censuses estimates will have firmer bases."

Vital statistics

Statistics on births and deaths are in general much less adequate than those on population. It is estimated by the United Nations that while roughly 80% of the world's population has been enumerated in the last decade, only about 47% of births and some 33% of deaths are currently being registered. The reason for this disparity is "that censuses are primarily dependent on the resources and efficiency of the statistical administrations as well as on the collaboration of the population while availability of vital statistics depends to a larger degree on the participation of the whole population which is responsible for the registration of births, deaths, marriages and other vital events."

Africa and Asia are the continents most deficient in such statistics. In 1956 out of a total of 214 countries or territories only 4 in Africa, 18 in the Americas and 7 in Asia forwarded comprehensive birth and death statistics to the United Nations, though it is necessary to qualify this statement with the remark that comprehensiveness is not necessarily always allied to accuracy. Difficulties in obtaining adequate vital statistics are rarely due to any single direct cause. Even in a single country there may be much variety in the extent to which registration of vital events is carried out. In almost all countries the degree of efficiency in collecting such material varies from possibly very high in cities and towns to very low in rural areas.

This deficiency in knowledge of the occurrence of births and deaths in the world is a barrier to the full discussion let alone the planning and execution of programmes for improving health. Its nature is such that many international and national health

programmes depend about what is true.

Health statistics

It is axiomatic that a high level of social and epidemiological statistics can be expected in a country with a high level of fundamental administrative and social services. As a country improves its social government and provides a progressively gradually widening series of social services, it reaches a stage when it is possible for it to obtain the essential facts for a study of its social, economic and health problems. At the present time there are serious gaps in the collection of data on such matters as causes of death and disease by age, sex and season, or even causes of death alone. This is confirmed by the fact that in 1958 only the following returns were available to WHO in this connexion:

Subject	Number of countries and territories
() causes of death	93
() causes of death by age and sex	77
() incidence of communicable diseases by season	176
() incidence of other diseases	7

It is estimated that about a further 100 countries and territories would need to submit returns before even a simple picture of world mortality and morbidity can emerge.

In 1953 WHO sent a questionnaire to its Member States to elicit information on the types of health statistics and related vital statistics available in different countries, on how they were obtained and to what extent they were being transmitted to international organizations. A certain number of countries answered fully, others did not answer at all or gave very incomplete answers since comprehensive answers would have involved them in months of patient research. The replies received show that in advanced

L. Edmonson (1957) *Demographic yearbook 1957* New York, p. 1.
L. Edmonson (1956) *Demographic yearbook 1956* New York, p. 14.

Details on causes of death from some 50 countries only are considered by WHO as "national level" for publication in its *Annual Epidemiological and Vital Statistics*.
B. H. Wild, *Health Org.* 1954, 11, 201.

called upon to do in health statistics can be summed up as follows

To consolidate basic data received from countries or extracted from various national statistical or epidemiological publications by the routine collection of data on diseases health service facilities health personnel and major activities of health services e.g. vaccination the collection elaboration and analysis of vital and health statistics the keeping of up to date records of such statistics published in the monthly *Epidemiological and Vital Statistics Report* and in an annual volume

To assist countries in the organization and development of their national health statistical services

To conduct a general survey of the present situation of vital and health statistics in the world in order to plan a long term programme of assistance to countries

To assist national administrations through expert advice by the statistical officers of the Organization or by special consultants

To assist in improving the collection of national data so as to achieve better inter national comparability of such data

To encourage the broader utilization of national committees on vital and health statistics through meetings of representatives of such committees

To ensure the sound application of statistical methodology indispensable for an adequate evaluation of the work performed and the results achieved

To process and analyse the statistical data produced in connexion with studies conducted by various units of WHO

To establish a classification of diseases injuries and causes of death and its application to the compilation of morbidity and mortality statistics

It is generally admitted that the number of countries producing reliable and adequate basic data is very small. The extent of the problem will be clear from the pages that follow

Population data

In such a basic matter as the enumeration of human population the position was far from satisfactory in the ten years preceding the end of the Second World War. The United Nations has reported that during that decade only 44 sovereign countries undertook population censuses. These were distributed as follows: 3 in Africa, 9 in North America, 6 in South America, 9 in Asia and Oceania and 17 in Europe.³

This situation could not fail to have an adverse effect on health work for no public health programme can be adequately planned or maintained in the absence of such fundamental data as the size of human populations, their age and sex constitution and their rate of change.

In the ten years since the end of the war which approximately cover the first phase of WHO's work, there has been a considerable improvement in knowledge of the human population of the world, much of it due to the continuous efforts of the United Nations in this field. In its *Demographic Yearbook* for 1957 the United Nations estimates the population of the world in 1956 as 2737 million with a margin of error of 5/4. An increasing proportion of the world's population is being enumerated by censuses but certain reservations are necessary concerning the completeness and accuracy of the results recorded in many countries which lack experience in census work. The United Nations *Demographic Yearbook* states that population estimates in the majority of countries are still subject to error because of the lack of recent adequate censuses, especially in South East Asia, the Eastern Mediterranean and Africa. It is shown that estimates for 78 per cent of the world's population in 1955 were based on census counts made since 1945 while 9 per cent originated in partial censuses, surveys or older enumerations and 12 per cent had conjectural estimates for a base only 25 per cent of the countries of the world.

³ United Nations (1956) *Demographic Yearbook 1956* New York p. 10

⁴ United Nations (1957) *Demographic Yearbook 1957* New York p. 13

quarantinable diseases could have only a restricted scientific value owing to the probable incompleteness of many of the basic notifications from areas without physicians or health administrations

Morbidity statistics

In proportion as the campaigns against the great killing scourges have met with success interest has grown in causes of diseases which are widespread but not in themselves immediately fatal. This type of morbidity has figured with increasing prominence in the discussions of international councils of statisticians and epidemiologists in the last two or three decades and its statistical and epidemiological definition and analysis have proved particularly difficult. Whatever the causes of this morbidity—whether they were acute communicable chronic neoplastic or accidental—they raised basic questions of terminology classification and measurement by suitable indices. Until these were answered epidemiologists and statisticians could scarcely employ any refinement of analysis in defining the significance of the various causative and correlative factors. In turn these raised other difficulties as for example that of bringing uniformity into the collection of morbidity data from different regions where methods of diagnosis and nomenclatures varied in efficiency completeness and form.

One particularly troublesome statistical problem has been that of the hospital record. Even though case records have accumulated in hospitals for generations no simple means has yet been evolved for the international use of what superficially appears to be an invaluable source of clinical and pathological material for epidemiological purposes. This general statement does not belittle the valuable contributions which have been made not only to clinical medicine and pathology but also to epidemiology and public health by numbers of individual studies based on morbidity records from hospitals in many countries. It is only in the present decade that international studies have been undertaken to develop their comparability an important facet of the

more general problem of comparability in morbidity statistics

Statistical methodology

By the end of the Second World War considerable developments had taken place in the theory of probability sampling methods and techniques for field trials surveys and controlled laboratory experiment. These techniques were obviously urgently needed and the fact that this methodology had at first appeared in countries with well organized social medical and statistical services was no argument for delaying the application of some of the newer techniques in countries lacking them. Indeed many of these techniques were admirably suited to epidemiological and statistical enquiry in almost any community however primitive its condition or however awkward its physical environment. Above all the method of sampling had been so improved that it could be operated at relatively small cost provide up-to-date data and give a reasonably accurate picture of the health situation.

A technique of some value in epidemiological and statistical work is that of the survey. Early surveys of such matters as the incidence of disease based on hospital populations out-patient records or general practitioners' returns omitted many of the checks and adjustments required to remove distortions caused by such factors as differing age and sex composition. By the middle of the present century however the limits and fallacies as well as the advantages and potentialities of surveys had become much clearer. The technique of the survey had been so developed as to make it suitable for regions of the world from which no records of diseases had been previously available. The hazards of surveying such highly selected populations as hospital patients or industrial communities were known and frequently could be overcome. It had therefore become possible for experienced people to use surveys profitably in the service of international health statistics.

At the same time a fuller appreciation was being gained of the application of statistical

countries even though health statistics are numerous they are varied and scattered among many government departments other than the health department for example the social welfare administration (social insurance returns hospital statistics), the defence department (statistics of the army navy and air force) and the education department (school medical inspection returns numbers of graduates in medicine and allied professions). In many countries the provincial or municipal authorities are responsible for health and do not necessarily supply statistics to the central government and where statistics are supplied they are not necessarily uniform from province to province. In some countries there is decentralization of government, with consequent decentralization of health statistics or the organization is federal with a like result. Nor is the terminology used uniform medical schools differ greatly in background and methods of training and diagnoses are couched in terms that vary not only from country to country but also within the same country. Again a bed in a remote jungle hospital can hardly be placed on a par with a bed in a large teaching hospital in an advanced country although both are called "beds". Similarly the meaning of doctor nurse etc. will differ from country to country or even within one and the same country.

Statistics on causes of death

The statistics available to WHO on causes of death suffer from further defects. In many countries there are not enough physicians to attend every dying patient and certify the cause of death. If it is recorded at all it will be by a lay registrar who may be merely guessing from crude information provided by relatives. Only a few countries have medical services with sufficient staff trained to give an accurate medical certificate of death. Indeed the countries giving satisfactory information both on the actual occurrence of death and on its causes could be numbered on the fingers of one hand. The usefulness of material collected on a world wide basis

for regional or world analysis is therefore exceedingly limited. To its inherent defects of inaccuracy and incompleteness there must be added the serious difficulty of determining comparability between one country and another.

Quarantinable disease statistics

As soon as international health co-operation began to develop the need for statistical and epidemiological data on the so-called quarantinable diseases became apparent. Hence such information is available in some detail right back to the beginnings of such predecessors of WHO as the Pan American Sanitary Bureau the Office International d'Hygiene Publique the League of Nations Health Organisation and UNRRA. The information collected by all these organizations had a dual purpose.

Primarily it was collected with the intention of guiding countries in any administrative action they wished to take against the threat of invasion by quarantinable diseases from other countries. Indeed this was the major purpose of the comprehensive network of stations established for the collection and diffusion of data on quarantinable diseases. The second purpose was the scientific determination of some of the circumstances governing the behaviour of these diseases particularly when they took an epidemic or pandemic form. The statistics obtained had a certain value in showing the historical trends and geographical diffusion of each disease during a period of fifty years or more.

WHO inherited a complete system for the collection and reporting of quarantine information: this involved dealing annually with some 7000 routine reports from health and statistical authorities. In addition to *ad hoc* telegraphic notifications the diffusion of the information was ensured by systematic broadcasting through a wide network of stations with occasional telegrams and routine air mailing of weekly periodicals from four focal points.

This system of collection and diffusion was valuable though it has been in dealing with the threat of the international spread of

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At the same time a fuller appreciation was being gained of the application of statistical

powerful support of the United Nations in appeals to countries and institutions for improved statistical services.

In that many health problems have facets to be examined by such other agencies as FAO, ILO and UNESCO the need for liaison with these agencies was accepted by WHO. The co-operation of individuals and of the non-governmental agencies had also

to be obtained in fact no agency had been more helpful in the earlier history of international statistics than the International Statistics Institute.

The importance attached by WHO at the outset to co-operation and co-ordination in its international programmes has undoubtedly been responsible for much of their success.

Reports of Expert Groups

Expert Committee on Health Statistics

For several years the World Health Organization has been concerned to improve the quality of morbidity and mortality statistics and especially to achieve a greater degree of international comparability. Progress so far has been slow, one of the main difficulties being that the methods of measuring morbidity and the definitions of the terms in common use differ from country to country.

With the recent publication of the sixth report of the WHO Expert Committee on Health Statistics¹ however a further step has been taken towards the establishment of a uniform terminology for morbidity statistics. Definitions are proposed for the terms "incidence", "period prevalence" and "point prevalence" and recommendations made regarding the correct employment of these terms. The various ways in which duration of illness may be computed for statistical purposes are also discussed and it is pointed out that the date of onset and

the date of recovery should be defined on the basis of uniformly applied criteria. The report then considers the application of these basic concepts—if necessary in modified form—to general surveys of sickness, hospital in-patient morbidity statistics, industrial sick absence statistics and social security morbidity statistics. It is recommended that as far as possible the concepts, definitions and terminology proposed should be adopted for use in the national or international presentation of morbidity statistics and that after a period of trial countries should report to WHO on the acceptability of these terms as standard definitions.

In connexion with long range plans for improving vital and health statistics the report reviews those sections of the International Classification of Diseases which appear to be most urgently in need of critical appraisal in preparation for the eighth revision. The three sections recommended for early attention are causes of stillbirth, mental, psychoneurotic and personality disorders and cardiovascular diseases. Studies on certain aspects of the classification of causes of stillbirth and that of cardiovascular diseases are already under way in some countries. The report emphasizes the need for international co-ordination of such studies and contains a number of recommendations with this aim in view.

Set out on p. 205

WHO Expert Committee on Health Statistics (1959). *Sixth Report*. (H/d H/d O. ed. R. S. N. 1964) 43 pages. Price 1/9 2/0 3/0 Sw. f. — Also published in French and Spanish.

Members of the Committee: Dr M. S. A. Bernice, France; M. F. F. Harris, Canada; Dr Gertrude Kallner, Israel; Dr Forrest E. Linder, U.S.A. (Vice-Chairman); Dr W. P. D. L. Gan, United Kingdom (Chairman and Rapporteur); Dr B. M. Khat, Federal Republic of Germany; Dr B. Sk. J. Y. Joshi, Yugoslavia; Representative for the U.N. Mr. R. J. M. M. R. I. M. Secretaries: Dr Y. Braud, WHO; Dr J. C. Cak. ov, WHO; Mr. J. Nielsen, WHO; Dr B. Pirc, WHO (Secretary); Dr S. S. Anoop, WHO.

Great importance is attached to regional meetings of health statisticians at which the health statistical situation in the countries concerned can be reviewed and the progress analysed. Among subjects that could be profitably discussed at such meetings the following are suggested: the health statistical systems in use in the various countries; education and training of health personnel in health statistics; the International Classification of Diseases and its application to various fields of health statistics; and methodology and results of health surveys.

The report also appraises the activities of national committees on vital and health statistics which are providing an important stimulus to the development of health statistics in a large number of countries. It is urged that WHO should be kept informed at least once a year of the activities of these committees.

During recent years advice on methodology and technical help in overcoming statistical problems have been provided on an increasing scale by the statistical services of WHO both within the Organization itself and to individual countries. At the same time a considerable amount of statistical material has been accumulated not only in the course of the routine collection of health statistics but also from WHO sponsored projects. The report urges that the possibility of subjecting this material to statistical analysis should be explored with a view to making the resulting information useful to a wider range of health workers.

Another problem briefly reviewed is the selection of health indicators for measurement of levels of living. It is pointed out that health indicators may also be used for other purposes: for instance in gauging the

needs of health services and their achievements or as one of the bases for framing social policy and that there is a connexion between health indicators appropriate for measurement of levels of living and those needed for social policy. On the other hand no single health indicator exists which can be considered objective, sensitive and meaningful and which at the same time is available in all types of communities. The opinion is therefore reached that for international comparisons recourse must be had simultaneously to several health indicators of varying degrees of meaningfulness and availability.

As noted in the report progress is being made with the preparation of a series of WHO manuals on health statistics methods and work on some of these has already reached an advanced stage. The Committee reviewed the envisaged programme which is shown in an annex and expressed satisfaction that the particular needs of less developed countries have been taken into account.

A second annex contains the third report of the Sub Committee on Cancer Statistics. This report is concerned mainly with methods for measuring the incidence and prevalence of cancer: the purpose and uses of cancer registration with recommendations on starting and maintaining a register; epidemiological studies on cancer and the statistical classification, nomenclature and clinical staging of cancer. There is also a brief discussion of studies which have been carried out to determine the reliability of cancer diagnoses on death certificates. It is recommended that such studies should be continued particularly where the mortality figures published by WHO reveal substantial differences between countries.

Plague Epidemiology and Control*

In spite of the remarkable reduction of the world incidence of plague the disease is still a potential danger. The WHO Expert Committee on Plague¹ which met in Geneva in September 1958 studied the various problems connected with this disease and has just published its report on the subject.

Epidemiology

Wild rodent plague

The Committee made a comparative study of the epidemiological characteristics of plague in various countries and regions of the world (China India Java Mongolia the USA the USSR Central Africa and the Eastern Mediterranean Region). In the course of this study it became obvious that a great deal more is now known about the species of wild rodents that act as reservoirs of *Pasteurella pestis* and about their ecology and that progress has also been made in identification of the parasite insect vectors of plague. Attention was drawn to the significance of the co-existence of wild rodents and commensal rodents in the vicinity of human habitations. The possibility of transfer of wild rodent fleas to commensal rats has been experimentally demonstrated with radioactively tagged fleas.

Investigations into the resistance of rats to plague have shown that many species are refractory to the disease. Whereas formerly it was believed that markedly resistant rodents were of little importance in the epidemiology of plague it is now considered that such animals play a decisive role in the perpetuation of the disease because they ensure the survival of the infected fleas. Perpetuation in fact depends upon the

maintenance in the rodents of a balance between resistance and susceptibility to the infection

Virulence of P. pestis

The question of the virulence of *P. pestis* should be approached from the ecological rather than from the laboratory angle. Apart from the knowledge to be acquired from this kind of study it is admitted that the strains isolated from human plague victims are almost invariably of maximum virulence when tested on laboratory animals known to be susceptible. It is also recognized that variations in virulence if present under natural conditions do not appear to interfere with the perpetuation of plague.

Vector efficiency

Work on methods of evaluating the vector capacity of plague infected fleas has shown that this capacity is extremely complex and may vary even among different strains of one and the same species. One important epidemiological factor noted is that under natural conditions many plague infected fleas are able to survive in a starved condition for at least a year. It is obviously important from the epidemiological standpoint that these studies should be pursued.

Control

The present state of plague therapy

The antibiotics are extremely useful in the treatment of severe cases of plague especially of the pneumonic form. Streptomycin however is liable to produce highly resistant variants of *P. pestis* in these cases. prompt application of another antibiotic may save the patient. The drugs of the tetracycline group are as effective as streptomycin and good results have been obtained with mycetrin and bacteriomycin. The sulfonamides are effective and in countries where only limited means and staff are available they would be the obvious choice for mass campaigns. sulfamerazine being the most

WHO Expert Committee on Plague (1959) *Trans. R. Soc. Trop. Med. Hyg.* 53: 1-165. 4 pgs. Price 19 \$0.30 or \$1.— Also published in French and Spanish.

Members of the Committee: Dr. S. A. A. ar Indonesia
Dr. M. Bal and Dr. R. A. A. ar Indonesia
Cong. Dr. R. B. L. A. ar Indonesia
Meyer USA (Chairman) Dr. B. A. A. ar Indonesia
Sec. Ind. A. A. ar Indonesia
WHO (Secretary) Dr. N. A. A. ar Indonesia
II WHO Dr. W. A. A. ar Indonesia
(Consultant) M. J. W. A. A. ar Indonesia

satisfactory. It must be remembered that overdoses of antimicrobial drugs may release toxin and it is therefore advisable to avoid the simultaneous use of different antimicrobial substances.

In serotherapy the use of unpurified horse and donkey ant plague serum has had unfortunate results and it will be necessary to increase production of purified antitoxic sera.

Vaccination and chemoprophylaxis

It is not known to what extent human beings are immune to plague. However vaccination—with living or killed germs—appears to reduce susceptibility to the disease and to increase the efficacy of the antimicrobial drugs. For this reason vaccination with existing vaccines should be continued at least until more effective vaccines are found.

The Committee reiterated the recommendations made in the second report of the Expert Committee on Plague regarding the value of antimicrobial drugs for the prophylaxis of contacts of persons suffering from pneumonic plague. In the USSR in view of the relative frequency of the pneumonic form of the disease the authorities apply chemoprophylaxis to all contacts of both pneumonic and bubonic plague. The treatment consists of a daily dose of 1 g of streptomycin for five days.

Measures for the control of wild and commensal rodents

The large scale campaigns for the suppression of wild rodents carried out in the USSR have provided valuable information. The most common method used was the scattering of poisoned grain from aircraft. The poisons used were zinc phosphide, barium fluoroacetate (more effective but also more dangerous for animals and for man), chloropicrin and cyanide preparations. Immense difficulties have been encountered in these large scale campaigns which require an enormous staff but they nevertheless demonstrate the possibility of eradicating plague from very extensive areas. Biological control

methods were found to be ineffective and sometimes dangerous.

In connexion with the control of commensal rodents (*Rattus norvegicus*, *Rattus rattus* and *Mus musculus*) the Expert Committee associated itself with the recommendations made in the eighth report of the WHO Expert Committee on Insecticides³ on environmental sanitation and the use of anticoagulant rodenticides (warfarin, Pival coumatheor and fumazine) and quick acting poisons (ANTU, sodium monofluoroacetate) and on baiting problems.

Control of plague vectors

Up to the present time no effective resistance to insecticides has been noted in the insect species involved in the propagation of plague. In general DDT dusting is extremely effective against fleas and the method of patch dusting in accordance with standards laid down by the Expert Committee on Insecticides⁴ is especially to be recommended on account of its efficacy and cheapness and the ease with which it can be applied. A 10% powder should be used against the less sensitive ectoparasites and very good results have also been obtained with 1.5% dieldrin and 2% aldrin dusting powders.

Diethyltoluamide, undecylenic acid, propylacetanilide and benzyl benzoate are good flea repellents for use on clothing.

Organization of plague control services

In the Committee's opinion a central control service should be set up in all plague areas with responsibility for the planning and direction of the various peripheral services and detachments. The peripheral units should be under the direction of fully qualified medical officers who in turn should have at their disposal an adequate team of specialists for the various branches of the work and an ample supply of equipment, antimicrobial drugs and insecticides. A constant watch must be kept for the first signs of plague in rodents and fleas so that preventive measures may be applied at the

earliest possible moment without waiting until cases of human plague have occurred

Unfortunately as plague becomes rarer it is less often diagnosed in time and in order to avoid this medical practitioners nurses midwives and other public health personnel who may come across cases of plague must be acquainted with the symptoms of the disease and with its emergency treatment

Organization of epidemiological surveys on wild rodent plague

As a rule a wild rodent plague survey should be carried out (a) when any human case has been notified (b) in case of an epizootic (c) when wild and commensal rats are in close contact with man. It is not possible to recommend a system applicable to all wild rodent plague foci but the survey should always include examination of the rodents and of their ectoparasites. This implies a considerable staff rapid and well equipped means of transport and adequate laboratory installations. An annex to the report gives details on the organization and techniques of these surveys with special reference to relations between survey personnel and local public health and other officials the need to inform the public the trapping of rodents and collection of ectoparasites dispatch of specimens to the laboratory field autopsy and examination of specimens in the central laboratories

Public Health Nursing

"As the concerns of a public health service move from measures of control and environmental management to the broader social and educational approach which characterizes the philosophy of public health today the service of the public health nurse will make an increasing contribution to the improvement of the health and welfare of

Recommended research programme

The Committee recommended that all possible attention be given to the following research programme

(1) systematic research on wild rodent plague in all endemic areas

(2) study of the variability of *P. pestis* under natural conditions and co-ordinated research on its virulence

(3) study of the pneumotropism of plague strains

(4) determination of methods of ascertaining the presence of the infection in the absence of definite plague symptoms

(5) study of the relationship between *P. pseudotuberculosis* and *P. pestis* and of the natural occurrence of the first named micro-organism in rodents and in man

(6) systematic search for more potent plague vaccines

(7) study of the biological control of vectors with special reference to their infection with microsporidia and other pathogenic protozoa

(8) organization of reference laboratories

(9) granting of facilities for exchange visits between heads of research services in the most important plague areas

(10) exchange of literature information and reports on plague

the people. In this conviction the WHO Expert Committee on Nursing¹ devoted its fourth report to a consideration of the functions and the administration of public health nursing services and the education desirable for the personnel concerned

Members of the Committee: M. T. K. Adra vala, I. di (Vice-Chairman), Mrs E. de F. na Alvim, Brazil (Chairman), Professor E. D. A. hark, USSR, Miss R. Freeman, USA (Rapporteur), Mrs G. Frère, Belgium, Miss A. A. Graham, United Kingdom, Mrs S. N. Iano, Japan, Secretariat: Miss L. M. Croftman, WHO (Secretary), Miss E. H. born, USA (Consultant), E. H. WHO, Dr J. S. P. erson, WHO

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Functions of the public health nurse

Certain basic functions are common to public health nursing services all over the world. Perhaps the most fundamental is the care and rehabilitation of the sick in the home closely allied to this task is the guidance of individuals and groups in how to keep well how to deal with particular problems of health and hygiene and where to turn for assistance in other difficulties. The public health nurse is a link between the general public and the network of medical and social services. Not only does she interpret the recommendations of the physician to those in her care she can also provide him with invaluable support both by relieving him of certain technical operations and by keeping him informed of factors in the personality or background of her patients which may affect their condition or their treatment.

At a step away from the immediate practical functions of the individual nurse it becomes apparent that she is also an important instrument of the entire public health programme. She assists in the collection of health statistics by encouraging the reporting of births and communicable disease she assists in the sanitation and accident prevention programmes by observing and reporting unsafe water or food supplies or accident hazards in homes and places of work and she contributes to the control of disease by recording items of epidemiological significance. Through studying the incidence and cause of school absenteeism she may contribute to the understanding of school and family health problems. By counselling the families she visits she supports the nutrition programme and helps in the improvement of working and living conditions in the home. Nor is her influence confined to implementing the public health programme at a certain remove she plays a distinct role in its actual planning since her experience is drawn upon by planning authorities at all levels whenever questions affecting her particular field of interest arise.

In many countries because of shortage or inaccessibility of physicians public health

nurses also undertake delegated medical responsibilities. In addition to this limited delegation due to necessity however there is bound to be a constant and more permanent transfer of certain traditionally medical functions to nurses as a normal development of the two professions. Before the standardization of temperature determinations by the use of a mercury thermometer for example the taking of temperatures was a medical prerogative after the procedure became more standardized it became a task of nursing. Today many other technical skills such as the taking of blood tests the giving of intravenous medications and the administration and reading of tuberculin patch tests are being transferred from the medical to the nursing sphere of activity. Similar assumption of non nursing functions may occur in the absence of social workers or of other health workers. Public health nursing tasks may in fact vary greatly from country to country being affected by the general level of economic development the degree of urbanization or industrialization characteristics of climate and terrain governing living conditions social and cultural factors and the level of health and vitality of the population. In the opinion of the Expert Committee WHO might well make a valuable contribution to future organizational development by sponsoring inter country evaluation studies of public health nursing services.

Administration of public health nursing

The importance of this aspect to the whole health programme is apparent when it is considered that the efficiency of the nursing service must constantly influence and be influenced by developments in related disciplines. Hence nursing plans should be co-ordinated with those of all other community health services and policy making and programme planning should allow for participation of the staff at all levels of responsibility.

The size and composition of staff needed to carry out an adequate public health nursing programme depend upon many and

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locally varying factors public demand for nursing care may not coincide with the true needs while the potential of nursing personnel will be determined by financial and educational resources and the general level of training of available nurses. Effective planning under such diverse conditions cannot be a routine procedure it demands a clear apprehension of the specific objectives proposed methods and anticipated outcome of every project.

Efficient administration depends greatly on the quality and appropriate deployment of personnel. Consideration should be given to the wider employment of male nurses and auxiliary workers whose contribution has been most effective. Staff must be accorded full scope for professional development thus requires a careful system of supervision a constant reinforcement of methodology (best provided by consultant staff who are expert in a particular field—for example mental health or tuberculosis where these are large scale problems) the provision of opportunities for his/her education and in service training and refresher courses. Workers need continuing help in appraising the work they are doing in developing intelligent methods of selection of priorities and in improving the quality of service. Work progress and results should therefore be evaluated periodically both by the nursing administrative staff and by medical or general administrative personnel. Standards of service should be clearly defined as a basis for evaluation.

Education for public health nursing

The Committee felt that preparation for public health nursing should be based on a sound general nursing education covering preventive and social as well as curative nursing. Specific public health tuition is of course also essential the basic nursing education programme should include instruction in epidemiology vital statistics community health organization and public health nursing management with perhaps additional teaching on school or occupa-

tional health and social and health legislation. Clinical experience of some duration in a public health setting such as a public health agency or a hospital out patient department must be arranged and opportunities for collaborating with allied professional workers should be encouraged. Post basic nursing courses may supplement or if necessary replace the preparation given earlier. They should aim at the same integration of public health and nursing content as characterizes the recommended basic programme. Courses devoted to special fields—midwifery mental health occupational health—may provide useful clinical experience.

Of particular importance is the training supplied for senior posts—supervisors consultants administrators and teachers. The complexity of inter professional relationships in public health nursing calls for highly responsible leadership combining technical competence in the allotted function (teaching administration etc.) with expertise in the clinical field of practice. Such advanced education should be offered at university graduate standard and in an inter-disciplinary setting so that public health nurses may acquire experience of team work with student epidemiologists sanitarians and medical officers.

The role of auxiliary workers in public health is an important one since there is increasing scope for the performance of many duties demanding less independent judgement than is expected of professional nurses. Training programmes for auxiliaries should be extremely flexible in both content and duration to fit the needs of the country concerned and the degree of responsibility to be assumed. Where adequate supervision is provided and the skills acquired are maintained through continuing study and refresher courses the contribution of auxiliaries to the smooth running of a public health programme can be of great value.

Research

In medicine teaching and research are considered an integral part of practice. So

found that they could not generally recommend this procedure

Leptospirosis

Intensive investigations have uncovered a wide host range in leptospirosis not only among domestic animals but in a variety of wild ones. One of the most dangerous leptospiral infections in man is still considered to be that caused by *Leptospira icterohaemorrhagiae*—Weil's disease—but serious infections with other serotypes also occur after exposure to contaminated water. The widespread infection of rodents and other mammals is an important source of disease for domestic animals and man epizootics have been reported in many countries.

The Committee made various recommendations on classification, typing and nomenclature. They recognized the agglutination (lysis) test as the method of choice in serological diagnosis and considered that the isolation of leptospirae by culture or animal inoculation should be attempted whenever possible. Definitions of serogroup, serotype and sub-serotype at present formulated serologically may eventually be based more satisfactorily on biochemical method.

In the prevention of human leptospirosis good results have been claimed for vaccination using formalized or mercuriolate vaccine. Animal vaccination could not be considered as completely successful because a carrier state occurred within individual animals although clinical disease was apparently reduced. High potency purified antiserum applied at an early stage has given excellent results in the treatment of Weil's disease; experiments with penicillin and other antibiotics have given conflicting results.

Tuberculosis in animals

During the past few years considerable progress has been made in the eradication of tuberculosis in cattle in many parts of the world—doubtless largely because of systematic application of the tuberculin test in cattle and removal of reactors; this has also resulted in a great reduction of bovine tuberculosis among the human population.

Non-specific reactions to the test however continue to present a problem requiring further elucidation. The Committee felt that the tuberculin testing method might be prejudiced by attempts to eradicate the disease in cattle through vaccination with BCG vaccines and vole strains which tend to create a sensitivity to tuberculin. They also felt that the chemotherapy of animals should be discouraged because of poor results, impracticability and high cost.

Other animal sources of human infection mentioned were monkeys, dogs, cats, parrots, goats and pigs.

Anthrax

This disease causes considerable economic losses from animal deaths and the cost of vaccination programmes while the annual number of human cases throughout the world is estimated at probably anything between 18 000 and 90 000. The principal sources of anthrax are infected feeding stuffs and fertilizers and animal by-products such as hair, wool, hides and skins.

For control to be established the responsibilities of health and agricultural authorities should be interlocked and provision should be made for rapid and adequate local diagnostic facilities, the destruction or opening of suspect carcasses, regular subsidized livestock vaccination programmes and education of farmers in recognizing the early signs of the disease in dealing with outbreaks in dairy herds and in noting its post mortem appearances in the abattoir.

Human anthrax should be controlled by State subsidized disinfection of potentially contaminated animal by-products used as raw materials in industry by the maintenance of import restrictions on such products and by vaccination of persons coming into contact with them. Both human cutaneous and animal anthrax have been successfully treated with penicillin and other antibiotics.

Psittacosis (ornithosis)

Some 100 species of birds of which more than half are psittacines have been found to be infected with the psittacosis lympho-

far this has not been true of the nursing profession and the advancement of public health nursing could be accelerated by the adoption of this principle. The Committee considered that there is a need for a cadre of nurses capable of planning and carrying out research aimed at developing nursing practice and of collaborating with other researchers on team studies in the public health field.

Here the education programme is of the first importance. Owing to the great variations in training it is possible for nursing students to reach graduate status with quite inadequate scientific knowledge. Preparation for research work must therefore be based on a thorough training in science with graduate level courses in public health and

related fields such as social sciences epidemiology or physiology.

The future

Over the past few decades public health nursing has shown a great capacity for change. The work of the individual nurse is geared to the demands of public health as a whole—demands which are continually expanding but which present the greatest variety according to conditions prevailing in different parts of the world. Now is a suitable time for careful evaluation of the types of services needed in the different countries, the kind of personnel who should render them and ways of best providing them in the future.

Zoonoses*

In August 1958 the Joint WHO/FAO Expert Committee on Zoonoses¹ redefined the term zoonoses as those diseases and infections which are naturally transmitted between vertebrate animals and man more than 100 of these are now recognized. Domestic animal reservoirs of such diseases are a source of considerable danger for man and the Committee felt that within national administrations close collaboration in the development of animal disease control between the various agencies concerned (particularly the medical and veterinary services) was highly desirable.

The following major zoonoses were discussed: salmonellosis, leptospirosis, animal tuberculosis, anthrax, psittacosis (ornithosis).

Q fever, arthropod borne viral encephalides and hydatidosis. Taking each of these diseases in turn the Committee considered its incidence, the role played by the different animals involved and the most suitable methods for control. Problems of diagnosis, the life cycles of infecting organisms, links in the spread of infection to man, the development of appropriate vaccines and the use of antibiotics in the treatment of several of these conditions were the salient points in the discussion.

Salmonellosis

Not only is the reporting of *Salmonella* infections in man and animals on the increase but also apparently the real incidence. This may well be attributable to the growing national and international distribution of foods susceptible of contamination such as meat, eggs and egg products, milk, fish and vegetable products. The need for a high standard of hygiene, particularly in abattoirs and meat packing plants, cannot be over emphasized. The control of animal infections by treatment and vaccination has sometimes been reported as effective but the Committee

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Steel USA (Co. l. t. t.)

Possible relationship of human and animal influenza

The Committee noted the progress of an animal serum survey undertaken by WHO in some 25 countries since the human influenza pandemic of 1957¹. The purpose of this survey was to determine whether the A/Asian (A2) strain or a closely related one existed in the animal population before the outbreak and if not whether the strain would establish itself in domestic animals (horses and swine) susceptible to other strains of type A virus. The continuation and expansion of analogous surveys were strongly advised.

Further problem

The Committee also briefly discussed recent developments in the study of toxoplasmosis, listeriosis, cutaneous larva migrans, dermatomycosis, trematode infections, tularemia and cat scratch disease. Recommendations were made on the reporting of zoonoses on methods of investigation of the ecology of

wild animal reservoirs on the study and grouping of the "orphan" viruses (which have been described as "viruses in search of a disease") and on the need for clarifying the natural history of specific disease agents particularly with regard to the possible emergence of new zoonoses. Specific studies on this final and highly important problem are under consideration by WHO and FAO.

The persistent threat which zoonoses constitute to the public health and economy of many countries can thus best be combated by further extension of research along the lines indicated by the Committee by the improvement of reporting services by careful attention to food hygiene by the free and frequent exchange of information both internationally and between the internal agencies concerned and by the joint planning and financing of disease control campaigns and mutual assistance in laboratory and epidemiological work. Co-ordinated action by doctors, veterinarians, public health officials and agricultural departments offers the chief means of successfully controlling these diseases.

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The effects of loneliness on hospital admissions

One of the most striking and objective indications of the effects of relative deprivation of human companionship is given by the figures (for hospital admissions) for England and Wales cited in the report of the Gullberg Committee. Compared with the demands for admission made by single men and women and, to a lesser extent, the widowed, the proportion of married men and women aged 65 years and over in all hospitals is relatively small. In fact among the married the rise in the proportion of those hospitalized with advancing age is not very striking and does not reach high levels even after the age of 75. In England and Wales two-thirds of all general and mental hospital beds occupied by those over 65 years are taken up by the single, widowed and divorced. The single (i.e. never married) who constitute 1.6% of the population of 65 years and over contributed 55.4% of admissions to mental hospital. Poor old people have more human contact for those without relatives or friends must therefore claim high priority in a prophylactic endeavour on behalf of the aged in the community.

From the 21st report of the World Health Organization on Mental Health, *World Health Organization Series* 1959, 171.

Great Britain, Committee of Enquiry into the Cost of the National Health Service (1956) Report London.

granuloma group of organisms the infection of poultry has recently been recognized as a public health and economic problem.² Mammalian reservoirs of the disease have also been noted but so far few human infections have been attributed to this means of spread. Broad spectrum antibiotics are very effective in the treatment of the disease in man while experimental feeding and injection of parakeets with tetracycline compounds have shown good results. The control of infection in turkeys, ducks and squabs with antibiotics has however proved uncertain. The Committee felt that importation of psittacine birds should continue to be restricted to that of rare species or essential breeding stock until the value of control by medicated food has been definitely established.

Q fever

Over 50 countries report Q fever and in most of these domestic ruminants appear to be the major sources of transmission to man. Infected ewes are considered to be especially dangerous at the time of lambing. In the wild the life cycle of the disease appears to involve birds, ticks, the bandicoot and rodents. The evaluation of the importance of avian hosts in particular in the international transmission of the disease requires further investigation.

Simple and dependable diagnostic tests such as the micro agglutination and the capillary tests have lately been developed although the standard procedure remains the complement fixation test. Control of the disease is still ineffective in spite of the promise afforded by cattle vaccination but treatment of acute Q fever in man with broad spectrum antibiotics has been very successful.

Arthropod borne viral encephalitides

Evidence of infection with some members of this rapidly growing group has been obtained in almost all countries investigated. The Committee found that the possibilities

for control of tick borne encephalitis are better than those for the mosquito borne variety. The numbers of ticks can be reduced by careful management of pastures or by dusting infested areas with DDT or BHC and the disease can be avoided by encouraging workers exposed to risk to wear clothing impregnated with insecticides by the use of formalinized vaccines which give good protection and by heat destruction of the virus in milk. For the mosquito borne encephalitides the vaccines tested have not given very satisfactory results in man. In horses however formalinized embryo vaccines against Eastern and Western encephalomyelitis have been successfully developed.

Hydatidosis

Hydatidosis is usually caused by *Echinococcus granulosus* which commonly infects the domestic dog. It may also be caused by a second species of *Echinococcus* (*E. multilocularis*) having as its definitive host the fox from which it is transmitted to form the cystic stage in wild rodents.³ The life of *E. granulosus* after maturity is limited to some six months so that if re infection can be avoided dogs will become clear of the parasite in about eight months.

Control of the disease depends upon eradication of canine infections by anthelmintic treatment of dogs, elimination of strays, reduction of the wild canidae population, prophylactic measures against canine re infection and public education in its dangers. Arecoline hydrobromide so far remains the anthelmintic of choice but there is an urgent need for the development of a more effective drug.

Diagnosis of human hydatidosis still presents difficulties. X ray examination is of great value, certain allergy tests warrant further development and standardization and recent research on serological examinations indicates that the complement fixation test with an improved antigen and an indirect haemagglutination test deserve wider trial.

Assignments of WHO visiting professors in 1958

The three principal objects of the assistance given by WHO to governments in the field of education and training are first to help countries to deal with shortages of health and medical personnel secondly to promote technical skill and knowledge by teaching and demonstration teams by fellowships and all other available means and thirdly to assist in the exchange of scientific information

Against this background it is interesting to consider the scope and types of the subjects dealt with during 1958 by WHO visiting professors and the wide range of countries to which they were assigned. In all 33 senior teachers took up this task: 24 in medical and public health schools and 9 elsewhere. The total time occupied amounted to 291 months and 17 countries were visited (see table below)

Assignments by country		
	Professors	Total months
Afghanistan	2	
Burma	2	16
Cambodia	3	4
Ethiopia	3	30
Fiji	2	24
India	4	26
Indonesia	3	3
Iraq	1	1
Israel	1	1
Libya	1	1
Nepal	2	4
Nigeria	1	12
Pakistan	2	24
Philippines	3	10
Singapore	1	8
Malaysia	1	
United Arab Republic (Egypt)	1	12
	33	291

Assignments by subject		
	Professors	Total months
I. medical and public health schools		
Anatomy		22
Biology	1	12
Medical health	2	7
Ophthalmology	1	6
Paediatrics	8	65
Parasitology	1	1
Pharmacology	1	12
Physiology	4	43
Public health and preventive medicine	3	22
Radiology	1	9
Other		
Auxiliary personnel	5	30
Entomological sanitation	3	30
Physiotherapy	1	12
	33	291

Water pollution in Japan

Like all industrial countries Japan has a serious water pollution problem. Sewage disposal is often inadequate and the fouling of streams and rivers by factory waste is widespread. As a result the health of the people is endangered while rice growing and fishing—both of vital importance in the country's economy—are threatened by the contamination of streams and paddy fields.

New legislation to remedy the situation was recently passed by the Japanese Diet. It includes regulations for the control of water pollution and provides for the establishment of a control agency directly responsible to the Prime Minister and the appointment of a sanitary engineer as its chief administrative officer. In preparing this legislation the Japanese Government followed the advice of a WHO public health engineering consultant who visited Japan in August 1956 to study the problem and suggest practical measures for its solution.

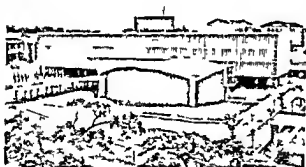
Notes and News

New WHO Building in Manila

A recurring difficulty of growing international organizations is that of accommodation. The Headquarters of WHO itself which since 1948 has been housed in part of the Palais des Nations Geneva under an agreement with the Swiss Government and the European Office of the United Nations now finds this accommodation inadequate and some of its services will shortly have to move to temporary premises in another part of Geneva. A proposal for an entirely new



View from the Conference Hall



General view of the new WHO building in Manila

WHO Headquarters building in Geneva is being submitted to the Twelfth World Health Assembly this month.

The WHO Regional Office for the Western Pacific has found a happy solution to a similar problem thanks to the generosity of the Philippine Government and Member States in the Region which have contributed to the cost of constructing a new building for the Office in Manila. Designed in contemporary style by a Filipino architect Mr Alfredo J. Luz the four storey building stands on a one hectare site made available by the Philippine Government. It is fronted by a spacious lawn and a miniature pool

and has a separate Conference Hall equipped with a simultaneous interpretation system and other up to date facilities. A special feature of the construction is the use of sun baffles to protect the offices from the tropical heat (see photographs). The building which was occupied by the staff of the Regional Office on 20 February 1959 also provides space for the offices of the Resident Representatives of the United Nations Technical Assistance Board and of UNICEF and the United Nations Information Office in the Philippines.



Another view of the building

met in the Regional Office in Copenhagen from 6 to 11 April 1959 to study rehabilitation needs and services in Europe and to discuss how WHO in Europe might best continue its work in this field. Participants were invited from Austria, Denmark, France, Greece, Italy, Poland, the United Kingdom and the USSR. The United Nations and ILO were also represented.

The following topics were discussed: European practices and policies in dealing with disablement; the magnitude of the problem and the need for further investigation; practical examples of rehabilitation services; rehabilitation and assessment of working capacity; rehabilitation in psychiatry; the role of different categories of medical personnel in rehabilitation; training of team leaders and workers in this field; organization of medical rehabilitation and related services including co-ordination at the national and local levels; relations with welfare, vocational and educational services.

Leprosy control in Africa

It is estimated that throughout the world there are some ten million persons suffering from leprosy, about a quarter of them being in Africa south of the Sahara. During the past few years mass antileprosy campaigns have been under way in a number of African countries and territories.¹

Some of the leprologists most directly concerned with the organization of these campaigns took part in an Inter-African Conference on Leprosy Control held at Brazzaville, French Equatorial Africa, from 14 to 21 April 1959, under the auspices of WHO and the Commission for Technical Co-operation in Africa South of the Sahara (CCTA). The participants—some 30 in all—also included leprologists who had worked in other parts of the world.

The Conference reviewed reports on the leprosy situation in the various African countries and territories represented and discussed the following topics: the organization of mass campaigns using mobile teams

and fixed treatment centres; the role of leprosaria and leprosy villages; the integration of antileprosy work into the general public health services; segregation of leprosy patients with particular reference to the separation of children from their infectious parents; and the social, physical and psychological rehabilitation of patients.

Meeting on yaws control

Yaws is endemic in the neighbouring countries of Burma, Cambodia, Laos, Malaya and Thailand, as well as in Indonesia and the Philippines, and in all these countries projects for the control of the disease are in operation or planned. Experience has shown that they have many yaws control problems in common, including the difficulty of continuing follow-up activities such as consolidation and surveillance, and that of co-ordinating activities in the border areas of neighbouring countries as well as in countries in the same geographical area in order to end the transmission of new infection across the borders or the intervening seas.

An Inter-Country Yaws Control Co-ordination Meeting at which the above-mentioned countries were represented was convened by the WHO Regional Offices for South-East Asia and the Western Pacific at Kuala Lumpur, Federation of Malaya, from 13 to 18 April 1959. The aims of the meeting were to make available to the participants the considerable body of experience that has accrued from the yaws control projects in the participating countries and elsewhere; to compare the approaches and techniques used in the various control programmes; to discuss common problems and possible solutions; and to seek the most effective means of co-ordinating yaws control activities in neighbouring countries with a view to the systematic eradication of yaws from the whole geographical area.

Seminar on veterinary public health

The first seminar on veterinary public health to be held in the Western Pacific

Third Asian Malaria Conference

Opening the Third Asian Malaria Conference which was held under WHO auspices at New Delhi India from 16 to 21 March 1959 Jawaharlal Nehru Prime Minister of India warned against the danger of slackening the pace of efforts to eradicate malaria. There is a great danger in going slowly he said lest the enemy should get accustomed to your weapons and then it will not be easy to master it. He went on to refer to the economic effects of malaria which he described as "in some ways the worst of all diseases afflicting mankind. There might be other diseases more painful more terrible and more fatal but perhaps sudden death was preferable to the slow death and decay brought about by malaria the enfeebling of whole populations and the sapping away of the vital energies of the people."

The Conference was attended by Ministers of Health and leading malarialogists from the following twenty countries and territories in the South East Asia and Western Pacific Regions: Afghanistan, Australia, Burma, Cambodia, Ceylon, Federation of Malaya, Hong Kong, India, Indonesia, Japan, Laos, Nepal, Netherlands, New Guinea, North Borneo, Philippines, Republic of Korea, Sarawak, Taiwan (China), Thailand and Viet Nam. Views were exchanged on the administrative, financial, legislative and health education aspects of the eradication programmes planned or in progress in these countries and territories.

Regional Conference on Maternity Care

In the Western Pacific Region as elsewhere WHO is helping many governments to strengthen and develop their maternal and child care services often in co-operation with UNICEF which provides the equipment and supplies needed by the governments for this work.

A WHO sponsored Conference on Maternity Care was held in Manila by the WHO Regional Office for the Western Pacific from 9 to 20 March 1959. The 46 participants

included workers in maternal and child health administration, clinical obstetrics, paediatrics, midwifery and nursing from 16 countries and territories in the Region. The Conference was also attended by representatives of UNICEF and the US International Co-operation Administration (ICA) and some WHO staff from field projects. The Conference staff included officials of the WHO Western Pacific Regional Office as well as consultants from other regions and from Headquarters.

The aims of the Conference were to review current maternity care problems in the Region and methods of dealing with them; to discuss the functions and training of professional and other health personnel engaged in maternity care; to promote better understanding and closer co-operation between workers in this field; to stimulate action for the improvement and more effective use of existing maternity care services and their integration into the general health services.

Medical rehabilitation

Schemes for the rehabilitation of the disabled have proved to be of considerable social and economic importance in a number of countries. In 1953 for example a rehabilitation service was established with United Nations assistance in Guatemala as a result the average treatment period for injured workers was reduced from 203 days in 1952 to 37 days in 1955. In Australia a few thousand persons formerly receiving invalidity pensions have been restored to productive employment by rehabilitation services. Not only does this represent a saving to the State on invalidity payments but the rehabilitated persons now make a substantial contribution to the national income.

The WHO Regional Office for Europe is paying increasing attention to the problem of medical rehabilitation and has been working for the improvement of rehabilitation services—particularly for physically disabled children—in co-operation with the governments of Austria, Greece, Italy, Spain, Turkey and Yugoslavia. A European Technical Conference on Medical Rehabilitation

Insect control

As part of a WHO programme to co-ordinate research on insecticide resistance and vector control throughout the world, Dr A. W. A. Brown, Head of the Department of Zoology of the University of Western Ontario, London, Canada, has been asked to make new contacts with investigators working in this field in Eastern Europe and Australia. A leading authority on insecticide resistance, Dr Brown was formerly attached to the Division of Environmental Sanitation at WHO Headquarters.

The Government of the United Arab Republic (Province of Syria) is at present investigating the control of various insects, particularly the anopheline mosquitoes, the flies and fleas, in connection with a WHO-assisted rural sanitation programme. Mr James B. Gahan, an entomologist from the United States Department of Agriculture Entomological Research Laboratory in Orlando, Florida, is spending three months in Syria organizing field studies on the ecology of these insects and advising on control programmes.

Malaria in Libya

Plans for a training centre for French-speaking malaria workers in the Eastern Mediterranean Region are being examined in Tunisia by Dr E. J. Pampana, who noted his retirement last year was Director of the Division of Malaria Eradication at WHO Headquarters. The centre which is to function for at least three years will train malariologists, entomologists, parasitologists, sanitary engineers and sanitarians and may also involve the African and European regions. Dr Pampana will subsequently visit Iran, on behalf of WHO, to advise the health authorities on the development of the national malaria eradication programme.

Dr Fritz R. Renfeldt has been appointed medical officer to the WHO-assisted malaria eradication

project in Cambodia. This is the development of a control project started in 1950 and is expected to be completed by 1960. Born in Antwerp, Belgium, Dr Renfeldt obtained his medical degree from the University of Munich and his diploma in tropical medicine from the University of Hamburg. He joined WHO in 1956, serving from 1956 to 1958 as senior medical officer to the anti-malaria project in Serranang, Central Java. From 1958 until his present appointment, he served as Regional Malaria Adviser at the WHO Regional Office for South East Asia.

Environmental sanitation

Mr Walter Tabosa, of Brazil, was recently appointed Regional Adviser in Environmental Sanitation at the WHO Regional Office for South East Asia. A civil engineering graduate of the University of Brazil, Mr Tabosa undertook post-graduate studies at the University of Michigan where he received the degree of Master of Public Health. Mr Tabosa has had extensive experience of environmental sanitation in his own country and in Panama, where as sanitary engineer to a WHO-assisted public health programme, he helped the Government to carry out a national domestic sanitary survey and to develop a five-year environmental sanitation programme.

The WHO-assisted environmental sanitation project in Ghana has as its aim the improvement of water supplies and of sewerage and drainage systems in various urban centres. Mr Moses Lilen of Israel was recently appointed to this project for a period of two years to advise the Ministry of Health on public health engineering problems and on the training of personnel. Mr Lilen studied engineering in Germany and France; he has served as District Sanitary Engineer in Tel Aviv and subsequently as Director of the Division of Environmental Sanitation in the Israeli Ministry of Health.

Deratting and Deratting Exemption Certificates

Under the International Sanitary Regulations, each health administration must notify the World Health Organization of the ports, nautical routes, and other points of entry and exit of Deratting Exemption Certificates only, or of both Deratting and Deratting Exemption Certificates. A recent supplement to the WHO Weekly Epidemiological Record (No. 16, 1959, 5 pp.) contains a list of ports approved and designated for the issue of such certificates as on 17 April 1959. A full text amendment to the list, which covers 100 countries and territories, will be published in the Weekly Epidemiological Record.

Region took place at Tokyo from 20 April to 1 May 1959 under the auspices of the WHO Regional Office for the Western Pacific and of FAO. It was attended by some 30 medical and veterinary officers from Australia, Federation of Malaya, Fiji, Guam, Hong Kong, Japan, Macao, New Zealand, the Philippines, Republic of Korea, Taiwan (China) and Viet Nam.

The aim of the seminar was to review veterinary public health programmes in the Region and to see how they might be improved. The topics discussed included the inter relationships of human and animal health and disease, some zoonoses of major interest in the Western Pacific, the control of food products of animal origin which are of importance in the transmission of disease, veterinary public health organization and practice, including collaboration between medical, veterinary and sanitary services and the training of personnel.

People and Places

Age grouping of malaria vectors

A WHO sponsored course on the application of advanced entomological techniques to malaria eradication was held from 12 to 15 April 1959 at the London School of Hygiene and Tropical Medicine. A large part of the course was devoted to the study of modern techniques for the age grouping of malaria vectors, a branch of applied entomology which has been particularly well developed in the USSR. The lectures and practical demonstrations on this subject were given by one of the foremost entomologists of that country, Dr Tatiana Sergeevna Detinova.

Dr Detinova, who studied medicine at the State University in Moscow, has worked since 1935 at the Institute of Malaria, Medical Parasitology and Helminthology, USSR Ministry of Health, Moscow. She is the discoverer of the method of determining the physiological age of mosquitos from the appearance of the tracheoles, and has improved the method of assessing the physiological age of female *Anopheles* from the presence of thickenings in the follicular tubes of the ovaries.

Sterility of biological preparations

General requirements for the sterility of biological preparations were formulated by a Study Group which met in Geneva from 20 to 25 April 1959. The Group, which was one of a series convened by WHO to draft internationally recommendable requirements for biological substances, considered various aspects of sterility control, including sampling procedure, acceptance criteria and tests to detect specific viral contaminants that may originate from human donors, animals and tissues used as source materials in the preparation of biological products.

WHO has already formulated general requirements for manufacturing establishments and control laboratories dealing with biological substances, as well as specific requirements for poliomyelitis vaccine, yellow fever vaccine, cholera vaccine and smallpox vaccine. These will be published shortly in the WHO Technical Report Series.

Maternal and child health centres

Reviews of selected aspects of maternal and child health activities are presented to the Joint WHO/UNICEF Committee on Health Policy every two years. The report to be presented to the Committee at its session in October of this year will deal with child care and nutrition education activities in WHO/UNICEF assisted maternal and child health centres. In connexion with this report, Dr Cecil Slome of Durban, Union of South Africa, will spend two and a half months studying these activities in centres in Kenya, Tanganyika and Uganda.

Educated at the University of Cap Town, the Institute of Family and Community Health, Durban, and the London School of Hygiene and Tropical Medicine, Dr Slome worked for six years as Medical Officer in charge of the Polela Health Centre of the Union Health Department, Pretoria, where his duties included care of expectant mothers and children of school and pre-school age in a rural African area. Since 1956 he has been Senior Lecturer and Family Physician in the Institute of Family and Community Health attached to the University of Natal.

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WORLD HEALTH ORGANIZATION

CORRIGENDA

Vol 13 No 2

PEOPLE AND PLACES

pp 101 102

The item headed WHO Area Representative in Nigeria gives an erroneous impression since Dr A. D. Talec has been appointed WHO Area Representative not only for Nigeria but for the whole WHO Western Area in Africa

p 102 left hand column 1 14

delete of Public Health and Population

insert for Overseas Territories

INTERNATIONAL NON PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

p 105 third name (Latin)

delete levoproxyphenum

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p 106 chemical formulae for diethylthiambutenum dimethylthiambutenum and ethylmethylthiambutenum in each case

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Vol 13 No 3

THE HEALTH OF SEAFARERS

p 115 left hand column 1 10

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Vital and health statistics

Preventive medicine without records is like a ship without a compass. Vital statistics have contributed immensely to the advancement of knowledge because they have given direction to its progress. As our knowledge of the causes of things increases, the need for more extensive records increases also. Nevertheless, we must constantly evaluate our statistics to find out whether they are in fact leading us forward or merely providing routine figures for general administrative purposes."

World Health Organization (1959) *First report on the world health situation 1954-1956* (Off. Rec. Wld Hlth Org. 94.2) Geneva

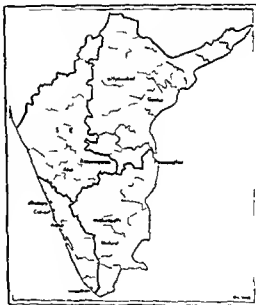
PROTEIN MALNUTRITION IN SOUTH INDIA

In 1955 the World Health Organization placed a grant at the disposal of the Indian Council of Medical Research for the extension of its investigation on protein malnutrition in the project at the Nutrition Research Laboratories, Coonoor, South India. The project as envisaged during the years 1955-1957 and some of the results have just been published in the Bulletin of the World Health Organization. The areas mentioned in the article are:

The extended programme of investigation on protein malnutrition in South India included a survey of the extent and severity of this condition and of the factors contributing to its incidence: the use of vegetable protein foods in its treatment or prevention and the evaluation of the nutritive value of proteins of the common cereals and pulses. The clinical and biochemical investigations on the two last mentioned aspects of the programme—the results of which will be published separately—showed that vegetable proteins are capable of promoting and maintaining satisfactory growth in young animals and of efficiently regenerating blood proteins in depleted animals and that they are useful in the treatment of kwashiorkor.

The area covered by the survey was limited to South India (states of Kerala, Madras, Mysore and Andhra Pradesh). This region covers 662 650 km² with a population of 94·8 million i.e. with an average population density of 146 per km². Over 80% of the population lives in villages with agriculture as the main occupation. Both in urban areas and in the countryside income is often inadequate to meet nutritional requirements. Rice and millet constitute the principal crops of the region; vegetables form an important part of the diet and groundnuts are used for the manufacture of edible oil. The four states taken together do not produce sufficient foodstuffs for their needs. Statistics for child mortality and morbidity are very inadequate but it is

LOCALITIES OF SOUTH INDIA WHERE THE INVESTIGATION WAS CONDUCTED



estimated that in South India the proportion of deaths among children under 5 years of age amounts to 20% as compared with 3% in better-developed countries. Diarrhoeas and dysenteries which usually precede malnutrition syndromes rank second to fevers among the causes of death.

The survey areas were selected in consultation with the directors of the health departments in the respective states and local health officials helped the survey team

These borders are recently transferred Hyderabad, in the state of Andhra Pradesh.
Rao, K. S. et al. (1959) Bull. W. H. O. 20: 503

The mention of specific companies or of certain manufacturers products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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sufficient to make up the protein deficit in this age period

2 As the breast milk output declined the quantity of supplementary foods increased but even then the protein intake of children up to 3 years of age was insufficient

3 It was only from 3 years of age upwards that the calorie intake approached the recommended level. Consequently protein and probably calorie deficiency must exist in these children particularly from the seventh month of life up to 3 years of age a period which as is well known is characterized by the maximum incidence of kwashiorkor

Clinical examination

The 4536 children were submitted to a careful clinical examination with special reference to signs and symptoms of kwashiorkor. 25% of the children examined had a history of diarrhoea and 25% had suffered earlier from one or more episodes of oedema. Some 10-12% of the children's sibilings had died of diarrhoea or oedema or both. At the time of examination 12.18% of the children were suffering from diarrhoea. The signs of protein malnutrition looked for in the children were dermatosis, hair changes, hepatomegaly and moon face. Oedema associated with diarrhoea and one or more of the above signs was included under the term kwashiorkor.

Diarrhoea and dysenteries were the commonest complaints among the groups surveyed. Signs of dyschromotrichia, hepatomegaly and moon face were found with varying degrees of frequency. This frequency was uniformly high in the Hyderabad area where infants had relatively less adequate diets than in other regions. Frank cases of kwashiorkor were seen in all areas. However, the number met with in the field was not high in areas where there were facilities for hospitalization.

The heights and weights of the children examined showed considerable retardation by comparison with the average figures for the United States. The degree of retardation was relatively low in the early periods of infancy but became more and more apparent

as the child was switched over to mixed feeding. In addition to protein and calorie deficiencies in the children's diets, it is very probable that there were simultaneous mineral and vitamin deficiencies as shown by the frequent occurrence of angular stomatitis and Bitot's spots. The retardation of growth must therefore be considered as the overall effect of various deficiencies, any one of which by itself is capable of affecting growth.

In approximately 20% of the children examined, haemoglobin, total serum proteins, albumin and globulin were determined. The haemoglobin values were uniformly low in all areas. In view of the absence of malaria and the low incidence of hookworm, the mild degree of anaemia would appear to be due to malnutrition. In the absence of comparative data on serum protein and its fractions in a large number of healthy children from the well-to-do communities, it is difficult to interpret the results obtained in the survey. The levels of the total serum proteins would however seem to fall within the normal range. The albumin values were somewhat lower than normal, which was probably a reflection of the chronic protein deprivation to which the children were subjected.

Field surveys cannot determine the true prevalence of the clinical syndromes that require hospitalization. The investigation had therefore to be extended to hospitals. It was found that kwashiorkor accounted for 5.16% of all admissions of children, which indicates that this disease is one of the major paediatric problems in the states of South India.

Protein malnutrition syndrome and contributory factors

It is difficult to estimate exactly the prevalence of the protein malnutrition syndrome in the population under survey. On the basis of the census of 1951, the total number of children under the age of 5 years in South India may be estimated at 14.2 million. As 86% of families in the area have incomes of less than Rs 100 per month, the number of children belonging to the low income groups must be about 12 million, assuming that the

to make contacts with the people. The departments of agriculture, fisheries and animal husbandry furnished information on regional resources. Whenever necessary home visits were made to study actual living conditions. In the clinical examinations conducted during the survey signs and symptoms of malnutrition were recorded. As most cases of kwashiorkor are removed to hospitals it was necessary to examine hospital records. The matters studied included the socio-economic and living conditions of the families surveyed, their general food habits, infant care and feeding and weaning practices, the food intake among infants and young children, deficiency signs and children's heights and weights. In addition haemoglobin and serum proteins were determined.

The survey which was confined to children under 5 years of age in the less favoured social groups covered a total of 4536 children in ten widely separated rural and urban areas. In 86% of the families surveyed the income was less than Rs 100 per month. In rural areas about 80% of the people lived in single roomed thatched huts. The others occupied brick built tiled buildings. In the majority of families the young and old of both sexes lived and slept together in the same room, a corner of which was set apart for cooking purposes. Urban conditions were somewhat better though also very inadequate. Environmental conditions were very favourable to the initiation and spread of gastrointestinal and other infections.

In general the daily diet consisted of two or three meals made up mainly of cooked cereals. To this there were added small quantities of vegetables and pulses. Meat, eggs, fish or milk were consumed only occasionally and in very small quantities, and a little vegetable oil was used for seasoning. The special food needs of the vulnerable groups such as pregnant women or nursing mothers did not receive any special attention. After weaning the children went straight on to adult foods.

Women from the poorer communities usually worked until late pregnancy and returned to work within two or three months

of delivery. When the mother was at work the baby remained at home in the care of the grandmother or an older sister. Sometimes the mother returned to the home two or three times a day to suckle the baby whose feeding was usually carried out with absolute disregard of the principles of hygiene. Sick children did not receive any special medical attention. The only prophylactic inoculation was smallpox vaccination. Frequently children were subjected to traditional prophylactic practices which were harmful to their health such as the regular administration of purgatives to clear the bowel of toxic substances, a practice which produces a state of chronic intestinal irritation in infants.

Infants were normally breast fed. Breast feeding began two to three days after delivery and continued into the second or third year of life; no regular feeding schedule was followed. In spite of their desire to continue suckling, very many mothers had to wean their babies during the first or second year owing to a new pregnancy or to drying of the breast. In all the areas except Hyderabad 74.97% of the babies were given some supplementary food during the first year. In Hyderabad only 5% of the infants were fed supplements in this period. Supplementary food consisted mainly of cereal products or animal milk according to tradition, price and availability. Supplementary milk was insufficient in quantity and was soon discontinued because of its cost in favour of cereals.

A quantitative assessment of the food intake of the children was carried out. During the first six months of lactation a steady rise was observed in the output of breast milk by mothers. This was followed however by a gradual fall in the milk output regardless of the child's needs. These results indicate the urgent need for supplementary feeding from the age of 6 months onwards. The study of the total calorie intake of children leads to the following conclusions:

1. On the assumption that breast milk would provide between the ages of 7 and 12 months an average of 7 g of protein per day, the supplementary foods were not

ANICTERIC VIRUS HEPATITIS

According to the report of the WHO Expert Committee on Hepatitis the multiplication of cases of hepatitis in the last few years has been a worldwide phenomenon. It is estimated that in 1955 there were 100,000 cases of hepatitis in the world. The multiplication of cases is due to the fact that the disease is now being reported from all parts of the world. The multiplication of cases is due to the fact that the disease is now being reported from all parts of the world. The multiplication of cases is due to the fact that the disease is now being reported from all parts of the world.

The existence of cases of virus hepatitis not accompanied by jaundice has been known for many years. Until quite recently liver biopsy which is not always practicable or advisable was the only means of diagnosing such cases with any certainty apart from cases of anicteric fulminant liver atrophy verified by autopsy. Accordingly it was a usual practice to give only a probable diagnosis when in an environment where cases of epidemic hepatitis had been recorded a patient—generally a child—offered a non-specific clinical picture of an infectious disease accompanied by gastro-enteric disturbances and the biochemical examinations gave results that were normal or but little modified i.e. light transient hyperbilirubinaemia sometimes with partial positivity of the colloidal serum lability tests.

Notwithstanding difficulties of diagnosis this form of hepatitis which is now considered as from two to three times more frequent than the icteric form particularly among children has attracted increasing attention. It is indeed of great epidemiological importance since unrecognized cases—and these are in fact the most numerous—are a constant source of infection both in

closed environments and for instance among blood donors.

In 1955 De Ritis, Coltorti & Giusti² published a new test which makes it possible to diagnose cases of virus hepatitis and to distinguish them from other liver diseases whether icteric or anicteric. This test involves determination of the serum transaminase activity.

These and later authors showed that in cases of anicteric virus hepatitis there is an increase of serum aspartic ketoglutaric transaminase and alanine ketoglutaric transaminase activity in the proportion of 2000-4000% with at the same time inversion of the ratio between the first and second of these transaminases. Normally 1/33 this ratio falls below 1/100 and may fall to as low as 0.50-0.70. This modification is not absolutely specific for virus hepatitis but it is of great practical diagnostic significance. The movement of these enzymes into the bloodstream is due to hepatic necrosis which is so intense and so widespread in this disease as to bring about a level of serum enzyme activity which is reached in no other liver disease. Of great importance also is the inversion of the ratio to an extent that is not

¹ W. H. A. Org. Arch. R. Ser. 1953 62.

² De Ritis, F. et al. (1955) *Bull. Wild H. & Org.* 20 9.

De Ritis, F., Coltorti, C. & Giusti, G. (1955) *Bull. Soc. Ital. Biol. Sper.* 31 394. *Minerva med.* (Torino) 46 120.

birth rates among different economic groups are equal. Even taking the incidence at its lowest as 1% it may be concluded that the probable number of frank cases of kwashiorkor in the region must exceed 120 000 at any given time.

Poverty is undoubtedly the main cause for the situation just described. As has been said 86% of the families have an income below Rs 100 per month this sum even if spent entirely on food would be inadequate to meet the nutritional requirements of a family.

Customs and traditional practices are the causes of the faulty feeding habits prevalent in the communities surveyed. Inappropriate choice of supplementary foods, avoidance of protein rich foods especially when the child is ill and continued administration of purgatives are only a few examples of such practices. Poverty and ignorance are also responsible for the unhygienic living conditions, the inadequate child care and the indifference to the needs of the child.

Infections usually precipitated the frank cases of kwashiorkor. Nearly 25% of the children examined gave a history of frequent attacks of diarrhoea while 12.18% were suffering from diarrhoea at the time of examination. Frequently a mere attack of fever without any diarrhoea produced changes in the pigmentation of the hair or even oedema. Probably the nutritional status of the children was so marginal that even quite minor infections sometimes resulted in acute clinical deficiency.

It is interesting to compare the results of the present survey with those of the surveys carried out by Brock & Autret³ in Africa

and by Autret & Behar⁴ in Central America bearing in mind that the conclusions of the present survey are based mainly on detailed observations in the field whereas those of the surveys in Africa and Central America were based on data supplied by the local authorities supplemented with limited field observations. In the three areas protein deficiency affected mainly the poorer sections of the society. There were certain similarities in diet and in infant feeding and weaning practices. Family diets were made up of carbohydrate rich foods and protein foods of animal or vegetable origin rarely entered into them. Except among the white population of Costa Rica prolonged breast feeding of infants was a common practice in all three areas. There was a striking similarity also in the choice of the foods used in infant feeding. The food intake of children was marked by deficiency in proteins. Of the children manifesting the syndrome of protein malnutrition 40% were over 4 years of age in Central America whereas in South India and Africa the majority were below this age.

Vitamin deficiency signs occurred with variable frequency in the different countries. In the African survey a manifest evidence of vitamin A or thiamine deficiency was not seen in association with the basic syndrome whereas in Indonesia 70% of cases of kwashiorkor exhibited xerophthalmia. In South India some 7% of the children examined had signs attributable to avitaminosis A or to the deficiency of B complex vitamins or both. In Central America the disease seemed to be associated with vitamin C deficiency.

Brock J F & Autret M (1952) Kwashiorkor in Africa (Ghana) *British Medical Journal* **2**: 108-110.

Autret M & Behar M (1954) Syndrome of protein deficiency (kwashiorkor) and its prevention in Central America (FAO Nutrition Institute No. 13).

WHO and malaria eradication

"the present WHO programme is by far the most logical, the most economical and the most effective of all malaria programmes proposed so far. In fact it may be said that the disappearance of this disease from every part of the world depends above all on the support given to this programme by the governments concerned, both in the interests of their own peoples and in a spirit of solidarity with other countries, whether near or far distant."

Henry G S MORRIS, *Lancet*, 1959, 67, 864

THE TREATMENT OF GONORRHOEA

The annual report for 1957 of the Ministry of Health for England and Wales¹ showed a further steep rise in the number of new cases of gonorrhoea of both sexes attending venereal disease clinics. If the considerable number of cases treated by doctors privately is also taken into account the number is beginning to approach that of the war years. This is in marked contrast with syphilis. In many countries the number of cases of early syphilis treated annually has fallen to as little as 5% or less of the war and post war peaks. This contrast prompts two questions: first given the known efficacy of penicillin in both diseases is there any explanation for this divergence in the results of treatment of these two closely linked diseases; and second is the divergence likely to continue? Dr R. R. Willeot, WHO Consultant on Venereal Diseases and Treponematoses, discusses these two questions in a recent number of the WHO Bulletin.²

Penicillin was introduced as a treatment for gonorrhoea during the Second World War. By then the sulfonamides which had revolutionized treatment a few years before had become ineffective in many parts of the world so much so that according to one report³ they failed to produce a cure in 75% of cases in Italy in 1943. This growing ineffectiveness was due to what is known as the increasing "resistance" of the gonococcus to the sulfonamides meaning its decreased susceptibility to them. From the time of their introduction approximately 10% of cases of gonorrhoea had failed to respond to these drugs and susceptible strains were gradually weeded out by this process of drug selection leaving the resistant strains. Acquired resistance was also it is thought fostered by the indiscriminate use of sulfonamides in inade-

quate amounts and at irregular intervals for the most trivial complaints.

The gonococcus on the other hand appeared not to be naturally resistant to penicillin: cases of gonorrhoea responded provided that the penicillin was maintained at an effective serum level for a sufficient period of time. Success in treatment was reported from all over the world in 90-100% of cases whether the penicillin was given in the form of injections of aqueous penicillin, penicillin in-oil, beeswax, procaine penicillin, G repository penicillins, combinations of penicillin or oral penicillin. At the beginning because of the fear that the penicillin given for gonorrhoea might mask but not cure syphilis acquired at the same time it was given in low dosage but as it became clear that even small doses of penicillin given for gonorrhoea would completely abort incubating syphilis the dosage generally given tended to rise. A WHO survey in 1955⁴ of the management of venereal diseases in ports revealed that 27% of those participating used an injection of 1.2 mega units or more of repository penicillin—usually in the form of procaine penicillin in oil with 2% aluminium monostearate (PAM)—while 84.4% used an injection of 0.6 mega units or more.

Notwithstanding the rising dosages of penicillin the failure rate in the treatment of gonorrhoea with repository penicillin has been increasing: there has been a persistence or relapse of the infection on all too many occasions after treatment. It is not possible on clinical grounds to distinguish between a relapse and a reinfection. If gonococci are still present after 24-48 hours it may reasonably be assumed that treatment has failed; if there is a recurrence after three months it may equally reasonably be assumed that the case is one of reinfection even if the patient denies it. But in between these two clear-cut instances lies uncertainty. Nevertheless the general consensus of opinion

M. J. J. of Health for England and Wales (1958) Part II of the 1957 Annual Report for the year 1957. Part II of the 1957 Annual Report for the year 1957. Part II of the 1957 Annual Report for the year 1957.

Bull. W.H.O. 1958, 19, 503

C. M. J. D. J. (1944) Brit. med. J. 2, 44

Bull. W.H.O. 1957, 16, 10-33

observed in any other disease which is probably due to a metabolic abnormality of the liver tissue consequent upon virus multiplication. The test gives positive results in both icteric and anicteric forms and makes it possible to diagnose the former before the appearance of jaundice whenever necrosis of the liver is already present.

In their recent paper De Ritis and his co-workers report the results of a systematic investigation they conducted in Rome among 104 children and 11 adults in an institution where several cases of icteric hepatitis had been observed over the preceding two years. They carried out determinations of the serum aspartic ketoglutaric and alanine ketoglutaric transaminase activities approximately every 15 days. This work was continued over a period of 60 days and some 1000 enzyme determinations were made. Throughout the period of observation the findings were normal in 69 of the children. In 4 the findings were considered doubtful whilst in 31 of the children and one of the adults they were positive. Only one of the children and the single adult affected developed jaundice at any time during the course of the disease. Many of the children showed clinical symptoms of hepatitis such as anorexia, dyspepsia, hepatomegaly and concurrent or delayed positive serum lability tests.

These results led the authors to the following conclusions:

1. In the first place there may frequently be dissociation between jaundice—which may be considered merely as an additional and late symptom—and hepatic necrosis, an essential physiopathological phenomenon in this disease and the direct consequence of the multiplication of the virus in the liver tissue.

2. The occurrence of jaundice in one of the cases nine days after the demonstration of serum enzyme findings—the equivalent in the blood stream of necrotic damage to the

liver tissue—leads to the conclusion that the incubation period of virus hepatitis is longer than was previously thought.

3. The anicteric forms of hepatitis predominate over the icteric forms much more in children than in adults. In the former the ratio is 30:1 whereas in the latter according to various authors it is usually 3:1. It was also found that children are much more susceptible to the disease than adults.

4. From the epidemiological standpoint these studies and other similar investigations are of great importance. Cases of anicteric virus hepatitis are generally not recognized or their existence is recognized only at a late stage of development when they have had time to be the source of secondary infections. They play an even greater part as sources of infection when they occur in more or less closed communities or among blood donors. There is naturally no difference between the epidemiology of the icteric forms and that of the anicteric forms.

5. Finally anicteric virus hepatitis may give rise to cirrhosis of the liver which may not be recognized. Statistically hepatitis is a much more important cause of cirrhosis than other conditions which are classically associated with it, in particular alcoholism and malnutrition. In some cases hepatitis may develop directly into cirrhosis during the acute phase of the disease. The period of clinical latency which sometimes is observed between hepatitis and cirrhosis would seem to represent the time necessary for the modifications resulting from the infection to produce the chronic lesions that are specific of cirrhosis. The authors have not attempted to postulate a constant and direct relationship between virus hepatitis and cirrhosis but they believe that their observations are sufficiently characteristic to be of interest to other research workers.

These results are still under investigation.

the public health prognosis of gonorrhoea is less favourable than it was even a few years ago in spite of the other drugs available.

There is a general impression that whether as a result of modern treatment or not gonorrhoea has become a milder disease. Severe complications such as rheumatism, arthritis, iritis and—though to a lesser extent—epididymitis and prostatitis are now relatively seldom encountered. It has indeed been suggested that the disease may now sometimes be so mild that some infected males as well as females are virtually asymptomatic, a situation which carries its own special dangers.

Whatever the future has in store, however, the present situation requires close watch. The indiscriminate use of penicillin should

in view of previous experience with the sulfonamides be discouraged as far as possible and every effort made to ensure that the doses of penicillin (or other antibiotic) used in the treatment of gonorrhoea are adequate. The alternatives the physician is faced with are larger doses of repository penicillins, shorter acting penicillins or mixtures of both or antibiotics other than penicillin alone or in combination. Which he should use in the light of the apparent lessened susceptibility of the gonococcus to penicillin is one of the pressing problems of the treatment of venereal disease. It will be among those considered by a WHO Expert Committee on Venereal Infections and Treponematoses which will meet in Geneva in September 1959.

ACCIDENTS IN CHILDHOOD IN THE AMERICAS

The present facts indicate that a study of the health conditions at the XVth Pan American Sanitary Conference held at San Juan, Puerto Rico, from 21 September to 3 October 1958, and in the tenth session of the WHO Regional Committee for the Americas, held at Lima, Peru, on 22-26 September 1958, in the paper by Dr J. M. L. Gould, Chief of the Division of Population and Family Welfare, Department of Health, Education and Welfare, has been a basis for the discussion and preparation of the Bulletin de la Oficina Sanitaria Panamericana.

"In 13 countries of the Americas accidents are already the chief cause of death in the age group 5-14 and if the trend of the last two decades continues they will within the next twenty years be the chief cause of death for all ages from 1 to 15 in a great many American countries. They cause immense losses in human resources: non-fatal accidents being in this respect more dangerous than non-fatal diseases (for with rare exceptions like poliomyelitis the latter end in complete recovery whereas non-fatal accidents may lead to prolonged invalidism, often permanent (if eyesight or a limb is lost) and so constitute a constant drain on the individual

the family, the community and the nation. Treatment of accident cases in hospital is also usually more costly than treatment of an infection because it takes longer and is more specialized.

Mortality rates in the Americas are much lower in the age group 5-14 than in the age group 1-4. In the latter accidents are the principal cause of death in the United States and in Canada, but appear among the five main causes of death in only 8 out of 18 other countries; on the other hand diarrhoeal diseases are the principal cause of death in 12 countries and appear as one of the five main causes in all countries but rank only as fifth in the United States and Canada. In the age group 5-14 accidents are the principal

is that repository penicillins are no longer as effective as they were in the treatment of gonorrhoea. Part but by no means all of the answer to the first question propounded at the beginning of this article is thus that in comparison with the treponeme of syphilis the gonococcus is apparently not as sensitive to penicillin as it once was. In addition it should be remembered that many more people are susceptible to gonorrhoea than to syphilis (a proportion of urban adults are seroreactors and so are relatively immune) gonorrhoea is three to four times more common than syphilis and has a short incubation period (usually 2-7 days) so that infection and spread are likely to be greater and certainly are quicker and gonorrhoea is the more infectious disease of the two and is therefore more likely to be acquired following a single exposure. It may remain infectious for a long time if it is undiagnosed untreated or inadequately treated particularly in women in whom there may be no alarming signs or symptoms. Indeed existing methods of diagnosing gonorrhoea in the female leave much to be desired. Nor is any substantial immunity produced by an acute attack. Syphilis on the other hand being less infectious may be acquired by only 50% of those exposed to it. As its incubation period is a long one (2-5 weeks) diagnosis of an infection gives the authorities a relatively long period in which to track down and treat contacts before they too become infectious and the length of the incubation period increases the chances of penicillin being given for an unrelated condition.⁵

Is the gonococcus likely soon to become as resistant to penicillin as it became to the sulfonamides? No definitive answer can be given to this question since no one can predict the future behaviour of these bacteria but Dr Willcox advances several reasons for making a guarded reply in the negative. One reason is that the resistance of the gonococcus to penicillin consists at present only of a reduced sensitivity and is thus a developing phenomenon that of the gonococcus to the sulfonamides was in some cases complete from the outset. Moreover

the problem of resistance is limited at present to the repository penicillins which produce low though prolonged serum levels. There is still no definite resistance to penicillin preparations which produce high serum levels for a sufficient time. It has taken nearly fifteen years of constant treatment with penicillin to reach this situation and it may reasonably be assumed that it will take a considerable time for penicillin to decline to the state of ineffectiveness so rapidly reached by the sulfonamides. Another reason is that there were no effective alternatives when the sulfonamides were first used so that resistant strains soon became widespread. Now there are many alternatives to penicillin: streptomycin, tetracycline, oxytetracycline, chlortetracycline, spiramycin, erythromycin, oleandomycin, chloramphenicol or certain combinations of these all of which give reasonably good results in the treatment of gonorrhoea. Resistant cases can thus be treated adequately by other means before the organism becomes widely disseminated. As in the case of the developing resistance of the staphylococcus to penicillin too if the use of penicillin is discontinued for a time the organisms may again become sensitive. A rapid appearance of complete clinical resistance of the gonococcus to penicillin is thus unlikely.

In the same issue of the Bulletin⁶ however Dr T. Guthe, Chief Medical Officer, Venereal Diseases and Treponematoses, WHO, Geneva, points out that experience in human pathogens and in insects suggests that once resistance has begun it progresses not at a uniform rate but often at an accelerating rate. The short acting penicillins with high serum levels now being used while perhaps of temporary benefit may only further weaken an already weakening epidemiological barrier because a patient is protected for a shorter time than with repository penicillins and so may become re-infected more quickly. This change of preparation may also affect the incidence of syphilis since short acting penicillins disappearing quickly from the blood are less likely to abort it in the incubation period. Both authors are agreed that

STATISTICS AND CANCER

It has become a platitude to remark that at least in the more highly developed countries of the world cancer is increasing *pari passu* with the increasing age of the population. Cancer research is likewise increasing and is now being conducted on an impressive scale particularly in the United States of America and in parts of Europe. Until now WHO has accordingly concentrated most on the co-ordination of statistical studies so as to give a world picture of the disease and has also paid much attention to the institution of cancer registers in countries where the medical and statistical services are sufficiently developed to make them a practical possibility. As early as 1950 a WHO Sub-Committee on the Registration of Cases of Cancer suggested definitions, rules and procedures for the compilation of statistics on the results of treatment and for computing survival and recovery rates.

A WHO Sub-Committee on Cancer Statistics which met in 1957¹ discussed methods of obtaining statistics of the incidence and prevalence of cancer which are an essential part of the organization of medical care, cancer control and epidemiological research. Mortality statistics are not a reliable measure of the incidence or prevalence of the disease because of the different survival rates of the various kinds of cancer. Compulsory notification as for communicable diseases suffers from the disadvantage that the minimum amount of useful information required for cancer is considerably more than is normally obtained for communicable diseases but it provides information which because of its confidential nature may not otherwise be obtainable. National cancer registration would be effective in small countries but it is doubtful if the results would justify the work involved in large countries. Surveys on the other hand either *ad hoc* of the type carried out in the

United States of America and France or as a by-product of general morbidity surveys do offer a distinct possibility. Other sources are generally inadequate and the Sub-Committee felt that on the whole investigations not specifically adapted to cancer do not supply the information required.

In a paper recently published in the WHO Bulletin² Dr Percy Stocks, formerly Chief Statistician (Medical) of the General Register Office London, writes on cancer registration and studies of incidence by surveys. Registration of cancers of certain types has been practised in some countries for many years for example epitheliomas due to tar pitch bitumen mineral oil paraffin and soot have been notifiable in England and Wales since 1895. In 1908 the first attempts were made in Norway and Denmark to register all new cases of cancer. In Norway after a prolonged trial it was realized that the medical and statistical resources available were inadequate for the purpose. In Denmark a census method was tried but although the response was good the method was found less useful than the continuous registration of cases. In 1927 cancer registration was initiated in Massachusetts and registration has gradually been instituted in a number of other countries and states. New York State made cancer reporting compulsory in 1940. In 1952 Norway introduced cancer registration based on compulsory notification.

The amount of information asked for in cancer registration or in surveys varies but may be grouped in the following way:

Personal information about patient

- A Name
- B Address
- C Place of previous residence (with durations)
- D Sex
- E Dates of birth and registration (or death) and age at registration
- F Place of birth

cause of death in two thirds of all American countries and are among the five main causes in all countries but Guatemala. There are few statistics of morbidity from accidents but there is some evidence to the effect that it ranks in importance with morbidity from the commonest non fatal diseases. In California for example an inquiry made in 1954-1955 placed incidence of illness from accidents second to illness from respiratory infections in children under the age of 15. In November 1956 according to an American Medical Association Hospital Survey 8% of all hospital beds in the United States were occupied by victims of accidents. In 1957 10% of admissions to the La Posta Children's Hospital Valparaiso Chile were due to accidents.

Among the most frequent causes of accidental deaths are traffic accidents, drowning, burns, poisons and bites and stings of poisonous insects and reptiles. Boys are victims more often than girls presumably because they are more active and take greater risks. There are also differences between the sexes in the type of accident. In Venezuela for example burns are the most frequent cause of accidental death among girls in the age group 5-14 whereas drowning is the most frequent cause among boys. The reason for this is that the girls stay at home more, do some cooking and of special importance wear clothing which is more likely to catch fire. There are also differences depending on the age groups. Accidental poisoning is commonest in children under 2 because of the well known propensity of small children to put things in their mouths. In the United States the principal causes of accidental poisoning are petroleum products, aspirin and other salicylates and arsenic and lead compounds. In some Central and South American countries however the common poisons are petroleum products, insecticides and pesticides, salicylates and the like rarely come into the reckoning because they are not consumed in any great quantity in these countries.

It is estimated that in the United States 16 000 000 children, two thirds of them boys

are victims of accidents every year. 45% of all accidents to children occur in the home, 10% on the roads, 30% in public places and 14% at work. This estimate does not differ greatly from one based on a study of accident cases treated in the emergency room of a municipal hospital in San Juan, Puerto Rico where the figures placed 56% of accidents in the home, 6% on the roads, 34.5% in public places and 3.5% at work.

Because there are so many causative factors, no single solution to the problem of accidents in children can be advanced. For prevention a better assessment of the problem based on the study of morbidity and mortality data is needed. Accident studies have already led to the adoption of specific preventive measures, thus in the United States after investigation manufacturers redesigned refrigerators to prevent children from asphyxiating themselves if they climbed in and closed the door and various protective devices were introduced into motor cars after a study by Cornell University of the types of injury caused by motor car accidents. Protective devices could help to reduce the incidence of accidents from burns in Chile where a brazier is traditionally used for cooking in rural areas either on the floor or just outside the door.

Education is the key to accident prevention. The public health authorities, physicians, paediatricians, schoolteachers, parents and all local groups and organizations should realize this and play their part. The work of the public health department in this field should be co-ordinated with that of the other agencies including education and traffic departments. Legislation may be required in the United States for example laws have been passed to control the use of inflammable materials for children's clothing and the manufacture and sale of insecticides.

If accidents do occur much can be done to minimize their consequences. Accident cases should be treated quickly and effectively and emergency services improved. Finally rehabilitation services should also be improved so as to reduce the degree of disability following severe injury.

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958

3 Securing international comparability¹

Efforts to secure international comparability in health statistics began as early as 1851 on the initiative of certain intergovernmental and voluntary organizations. Attention was then focused primarily on developing a uniform nomenclature and classification of diseases and causes of death. This in turn brought out the need for establishing uniform rules for the selection and certification of the cause to which a particular death was to be ascribed in case there were several contributory causes occurring jointly or successively. It was soon found that a number of complex technical and administrative procedures ranging from the certification of the cause of death to the final tabulation of the mass of data on mortality by age sex locality cause etc. required standardization. Many of the problems involved have been successfully resolved thus greatly contributing to the value and international comparability of health statistics and particularly mortality statistics.

During the last half-century the widening in scope of public health activity from control of preventable diseases and improvement of environmental sanitation to the promotion of health has created an increasing demand for comparable data on factors and conditions affecting the public health e.g. on such subjects as maternal and child health school health services mental health etc. Scientific advances in medicine and statistical methodology have further emphasized the importance of detailed and comparable statistical information. While many old problems still remain unsolved new ones are appearing—for example in connexion with the recently developed practice of measuring and comparing general morbidity levels of populations by sample surveys many of which are planned on a national scale.

The role of WHO

While the responsibility for operating national health statistical services rests with the country concerned it has fallen to WHO to take steps to develop uniform terminology definitions recording procedures classification schemes and at the same time to devise uniform programmes for the tabulation and interpretation of data by means of uniformly computed health statistics indices. Each of these tasks requires in the first instance a world wide study of the nature and causes of variations in statistical procedure. Some of these variations are bound up with the special needs of the country concerned some exist because of long standing legal and administrative provisions and some are related to the country's stage of development. But the keen desire of each country to compare its statistical indices on health with those of others has been fully demonstrated by the co-operation that WHO has received in its exploratory work and the willingness of the various countries to adopt international recommendations.

WHO has been particularly concerned to improve definitions of terms used in vital and health statistics and to make them comparable—tasks which are clearly interrelated. Through the Expert Committees set up by the Organization steady advances have been and are being made towards greater uniformity in this field. These Committees deal on the one hand with specific diseases such as tuberculosis malaria treponematoses cancer and heart disease to name only a few and on the other with general services such as public health administration environmental sanitation maternal and child health nutrition and mental health.

The recommendations of these Committees appear in the various reports in the WHO *Technical Report Series* and cannot be described in this brief review though mention should be made of the reports of the WHO

- G Marital state
- H Occupation
- I Previous occupations (with durations)
- J Nationality
- K Parentage (race) (colour)
- L Whether a twin
- M Work place travel to work
- N Kind of house heating and lighting
- O Sources of water and food
- P Dietary habits (present and past)
- Q Smoking habits
- R Age at marriage (females)
- S Number of confinements (females)
- T Age at menopause (females)
- U Informant
- V Name of family doctor

History of illness

- a Date of first symptoms
- b Nature of first symptoms
- c Date of seeking medical advice (or interval after a above)
- d Date of first hospitalization
- e Date of starting treatment
- f Date of death

Information about neoplasia

- 1 Diagnosis at admission to hospital
- 2 Final diagnosis (at discharge or death)
- 3 Site of primary growth (or of main secondary if unknown)
- 4 Nature of primary histology
- 5 State of primary
- 6 Site of metastases
- 7 Method of diagnosis
- 8 Kind of treatment
- 9 Reason for not being treated

Not all of this information is asked for by all countries and states which have cancer registers and surveys but most of it is and compared with say the international certificate of cause of death the amount of work involved in its collection is formidable and not lightly undertaken. Without it on the other hand statistics of cancer are of little value.

In the early years of a registration system the proportion of cancers remaining unreported until death is large. In Tyneside it was 31.1% in 1953 but it fell to 22.4% in

1954 the second year in Connecticut it was still 17% after some 15 years of registration. Obviously incidence rates based on the age at first diagnosis and the age at death differ considerably from the more realistic rates based upon the age at the first onset of symptoms. After a registration scheme has been in existence for some years the crude morbidity rates at all ages for stable forms of cancer i.e. cancer which is neither increasing nor decreasing in incidence will tend to be approximately the same whatever the criterion chosen for the starting point of the disease but the morbidity rates per age group will not because of the difference between the time of onset and the time of diagnosis and registration. There will also always be a number of patients who will not be registered until death (if then) because the diagnosis is uncertain. Apart from these difficulties which arise from the nature and course of the disease the quantity of information asked for the complication of the form to be filled in and the possibly lengthy follow up require a considerable amount of application on the part of the medical practitioners who do the registering and it cannot be expected that the results will be other than sketchy in the early years.

When a cancer register has reached the stage of producing a reliable series of rates of incidence by sex and by age it will become possible to study the incidence of cancer of different sites in relation to racial marital and social characteristics and habits. If its age distribution is known a subgroup of the population can be investigated by comparing the numbers known from the register to have developed cancer at a particular site with the numbers that would be expected if the subgroup was as liable to that form of cancer as the population is as a whole. An unusual incidence of a particular form may shed light on the etiology and pathogenesis of cancer on regional or racial differences or on environmental factors or it may point the way to new methods of control or care.

umbilical cord or definite movement of voluntary muscles whether or not the umbilical cord has been cut or the placenta is attached each product of such a birth is considered live born "

Foetal death is death prior to the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of pregnancy the death is indicated by the fact that after such separation the foetus does not breathe or show any other evidence of life such as beating of the heart pulsation of the umbilical cord or definite movement of voluntary muscles "

All live born infants should be registered and counted as such irrespective of the period of gestation and if they die at any time following birth they should also be registered and counted as deaths "

The International Statistical Classification of Diseases Injuries and Causes of Death

Part I of this account carried the history of this significant international instrument as far as the fifth revision of the International Lists of Diseases and Causes of Death which took place in 1938

The sixth decennial revision for which WHO became responsible was largely prepared before the Organization was created Following the fifth revision a United States Committee on Joint Causes of Death commencing work in 1945 had prepared a Proposed Statistical Classification of Diseases Injuries and Causes of Death This Committee included representatives of Canada the United Kingdom and the Health Organization of the League of Nations Its proposed classification was indeed the first successful effort to bring both mortality and morbidity statistics into one list and had been evolved after trials in the United States Canada and the United Kingdom The Expert Committee on Health Statistics set up by the WHO Interim Commission in 1947 submitted this classification to various national health and statistical authorities and presented it to the

International Conference for the Sixth Revision convened by the French Government in April 1948 in Paris Having been endorsed by the Conference it was finally adopted by the First World Health Assembly in July 1948 This Assembly also adopted the WHO Nomenclature Regulations "

These Regulations were significant making use for the first time of the important provision in the WHO Constitution whereby regulations adopted by the Assembly would automatically come into force in all those Member States which had not formally rejected them or entered reservations against them In the past the revision conferences had merely made recommendations to countries to adopt the revised lists frequently an ineffectual procedure The Regulations were thus the first application of the principle of "contracting out" in international health

The Regulations cover a comprehensive programme of international co-operation in statistics requiring Member States to publish statistics of causes of death for (a) the territory as a whole (b) principal towns (c) national aggregates of urban areas (districts) and (d) national aggregates of rural areas (districts) There are additional responsibilities accepted by countries observing the Regulations such as undertakings to publish statistics of causes of death by prescribed age and sex groupings and in accordance with the classification nomenclature and numbering of the International Classification of Diseases Injuries and Causes of Death

Perhaps the most important feature of the Nomenclature Regulations is the requirement that each Member State must adopt a form of medical certificate that provides for the statement of the disease or condition directly leading to death together with such antecedent morbid conditions as may exist so that the underlying cause of death will be clearly indicated together with any other significant conditions contributing to death which are not however related to the disease or condition causing death

OFF. REC. W.H.A. & Org. 1948 13 Annex 1. The full title of these Regulations is WHO Regulations regarding Nomenclature and Statistics of Diseases and Causes of Death. The full title of the Regulations is WHO Regulations regarding Nomenclature and Statistics of Diseases and Causes of Death. The full title of the Regulations is WHO Regulations regarding Nomenclature and Statistics of Diseases and Causes of Death.

Organization to compile French and Spanish versions from the basic English text employing medical terms in actual use while at the same time preserving as much as possible the original meaning and intent. Further improvement can be brought about by the users of the Classification in communicating such differences in local usage to the World Health Organization and by the physicians themselves in stating the meaning and the prevalent usage of a medical term."

Seventh decennial revision

In accordance with the decision to revise the Classification every ten years preparations were made for the seventh revision shortly after the publication of the Manual. A series of meetings of expert groups was arranged as for the sixth revision the results of the experience gleaned from the use of the Manual throughout the world were collated and governments were consulted for their views on how the Classification could best be improved. WHO's health statistical services had by now been established and provided an international clearing house for the co-ordination of statistics as well as promoting their international comparability. The WHO Expert Committee on Health Statistics furnished advice and assistance and special technical questions were considered by its subcommittees as for example the Subcommittee on Definition of Stillbirth—which dealt with the problem of enlarging and improving the relevant categories in the Classification which had proved in practice to be too few or insufficiently specific—and the Subcommittee on the Registration of Cases of Cancer as well as their Statistical Presentation. A Conference on Morbidity Statistics was held in 1951 to discuss the problems involved in the compilation presentation and analysis of statistics of disease.

An important additional source of advice and experiment in the use of the Classification was the WHO Centre for Problems arising in the Application of the International

Classification of Diseases, Injuries and Causes of Death. This had been set up by the Third World Health Assembly in 1951 on the recommendation of the Expert Committee on Health Statistics and had been established in the General Register Office of England and Wales not inappropriately for this was the office from which William Farr had issued the annual reports which did so much to set health and vital statistics on a firm foundation.

In the role of technical adviser and "laboratory" the Centre has dealt with a variety of practical problems encountered by countries in applying the Classification. It has helped in the interpretation of obscurities, advised on tabulation, listed ambiguities, defects and errors, studied the problems arising in practice from the utilization and coding of death certificates, advised on training in the use of the Classification, conducted research into national records on certification of causes of death, reporting of morbidity in hospitals and sickness surveys and drawn up practical instructions on how to collect record code and classify data in accordance with the Classification.

The Centre was responsible for the compilation of booklets of instructions¹ some of which will be considered later and it assessed changes in comparability of statistics due to the passage of time² basing itself on the constant flow of reports and queries from governments.

The mass of information accumulated from these various sources was considered by an advisory group which met in London in 1954 and proposed certain amendments to the Classification. These amendments were in turn considered by the Expert Committee on Health Statistics and later by the International Conference for the Seventh Decennial Revision which met in 1955 in Paris.

¹ World Health Organization (1957) *Handbook of instructions and decisions*. 4th ed., —

² World Health Organization (1955) *Medical statistics of the world*. Geneva: World Health Organization (1955). *Supplements on interpretation and instructions for coding cause of death*, Geneva.

³ World Health Organization (1955) *Comparability of statistics of cause of death according to the fifth and sixth revision of the International List*. Geneva.

⁴ World Health Organization (1957) *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death*. Geneva, vol. 1 p.

The action of the First World Health Assembly in adopting the WHO Nomenclature Regulations and the associated lists of the sixth revision was indeed a landmark in international health statistics. Among the features which make it outstanding are the agreement on a single list of terms applicable to both mortality and morbidity statistics, the comprehensiveness of the Classification, the degree of uniformity achieved, the agreement on a form of medical certificate based on the selection of the main cause of death to be tabulated, and the guidance given in a set of rules to national compilers using the lists.

In 1948 WHO implemented one of the decisions of the First World Health Assembly by publishing in two volumes the *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death* which was issued in English, French and Spanish. A shortened form in Latin⁷ was produced in 1955 at the request of a number of countries, mainly of central and northern Europe, which still use medical terminology in this language. This *Index Alphabeticus* does not provide for a classification of violent causes of death or illness according to the external agent involved, since there is no generally accepted nomenclature in Latin for describing external causes of death and their action (vehicles, firearms, etc.).

The sixth revision as adopted in 1948 also includes a detailed intermediate and an abridged list, thus maintaining the tradition of the earlier revisions. The detailed list contains three digit categories in seventeen main sections covering *inter alia* the chief infectious diseases, neoplasms, allergies, and metabolic and nutritional diseases. Other diseases are grouped mainly according to their principal anatomical sites, but there are special sections for mental diseases, complications of pregnancy and childbirth, early infancy, senility, and ill defined diseases. Injuries are placed in a dual classification, firstly according to the external cause, secondly according to the nature of the injury.

The introduction of the decimal classification in the detailed list has the advantage of making changes in the numbers given to items unnecessary when alterations from previous revisions are made. The first two digits of the three digit number in many instances designate important groups of diseases, while the third divides each group into categories which represent a specific disease or its classification according to some significant feature, such as the anatomical site. Certain numbers have been omitted to provide for future additions. The intermediate list includes 150 causes for tabulation of morbidity and mortality, the abbreviated list 50 causes for tabulation of mortality. A special list contains 50 causes for tabulation of morbidity for social security purposes.

The Manual also contains certain supplementary classifications: a model medical certificate of the cause of death, and an alphabetical index of diagnostic terms coded to the appropriate categories. A part of the Manual includes subdivisions of many of the three digit categories into four digit categories. These are intended for use by countries or services which wish to make more comprehensive studies of causes of illness, disability or death.

Although no serious objection has been made to the general structure of the Classification, an important section of the introduction to the Manual deals with certain of its features which have been questioned. Some of the shortcomings of the Classification reflect the persistent division of opinion between those using the anatomical and those favouring the etiological approach. The position given to such diseases as rheumatic fever, pneumonia, and influenza has also been criticized, since opinions differ as to the emphasis to be given to the conditions themselves or their complications and sequelae. Language is the source of serious problems. As the introduction puts it:

It is evident that versions of the Classification in languages other than English cannot be mere literal translations of the original text, but must be adapted to the medical terminology in actual use. Efforts have already been made by the World Health

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Organization to compile French and Spanish versions from the basic English text employing medical terms in actual use while at the same time preserving as much as possible the original meaning and intent. Further improvement can be brought about by the users of the Classification in communicating such differences in local usage to the World Health Organization and by the physicians themselves in stating the meaning and the prevalent usage of a medical term."

Seventh decennial revision

In accordance with the decision to revise the Classification every ten years preparations were made for the seventh revision shortly after the publication of the Manual. A series of meetings of expert groups was arranged as for the sixth revision the results of the experience gleaned from the use of the Manual throughout the world were collated and governments were consulted for their views on how the Classification could best be improved. WHO's health statistical services had by now been established and provided an international clearing house for the co-ordination of statistics as well as promoting their international comparability. The WHO Expert Committee on Health Statistics furnished advice and assistance and special technical questions were considered by its subcommittees as for example the Subcommittee on Definition of Stillbirth—which dealt with the problem of enlarging and improving the relevant categories in the Classification which had proved in practice to be too few or insufficiently specific—and the Subcommittee on the Registration of Cases of Cancer as well as their Statistical Presentation. A Conference on Morbidity Statistics was held in 1951 to discuss the problems involved in the compilation presentation and analysis of statistics of disease.

An important additional source of advice and experiment in the use of the Classification was the WHO Centre for Problems arising in the Application of the International

Classification of Diseases, Injuries and Causes of Death. This had been set up by the Third World Health Assembly⁹ in 1951 on the recommendation of the Expert Committee on Health Statistics and had been established in the General Register Office of England and Wales not inappropriately for this was the office from which William Farr had issued the annual reports which did so much to set health and vital statistics on a firm foundation.

In the role of technical adviser and "laboratory" the Centre has dealt with a variety of practical problems encountered by countries in applying the Classification. It has helped in the interpretation of obscurities, advised on tabulation, listed ambiguities, defects and errors, studied the problems arising in practice from the utilization and coding of death certificates, advised on training in the use of the Classification, conducted research into national records on certification of causes of death, reporting of morbidity in hospitals and sickness surveys and drawn up practical instructions on how to collect, record, code and classify data in accordance with the Classification.

The Centre was responsible for the compilation of booklets of instructions¹⁰ some of which will be considered later and it assessed changes in comparability of statistics due to the passage of time¹¹ basing itself on the constant flow of reports and queries from governments.

The mass of information accumulated from these various sources was considered by an advisory group which met in London in 1954 and proposed certain amendments to the Classification. These amendments were in turn considered by the Expert Committee on Health Statistics and later by the International Conference for the Seventh Decennial Revision which met in 1955 in Paris.

World Health Organization (1957) *Manual of the International Classification of Diseases*, vol. 1, p. 11.

World Health Organization (1957) *Handbook of statistics*, 2nd ed., p. 2.

World Health Organization (1952) *Manual of the International Classification of Diseases*, vol. 1, p. 11.

World Health Organization (1955) *Comparability of statistics of diseases according to the 10th revision of the International List*, Geneva.

This Conference made recommendations regarding the certification of death suggested deferring the problem of the classification of stillbirth until more experience had been gained from the use of the existing classification and advised less stringency in the application of certain of the WHO Nomenclature Regulations because the obligations they imposed upon countries sometimes exceeded national resources and even needs. It paid special attention to the major problem of obtaining information on health conditions in areas without doctors where causes of death could not be based on a proper medical diagnosis so that there could be no question of applying the International Classification. There was general agreement in the Conference that information was obtainable from such areas both on diseases and on causes of death by means of simple lists of causes stated in terms of obvious symptoms or broadly in terms of anatomical sites or systems. The Conference accordingly recommended that WHO consider ways and means of obtaining information in these areas and co ordinate national or regional studies on the subject.

The Ninth World Health Assembly adopted the seventh revision and the additional regulations giving effect to the various recommendations.¹ As experience had shown that the WHO Nomenclature Regulations were difficult to apply in many countries they were amended so as to allow greater freedom and flexibility in the reporting and recording of deaths and provide more convenient lists and age groupings for particular types of disease. There was no sacrifice of the fundamental principles of statistical uniformity and comparability.

The seventh revision and the attendant regulations came into force on 1 January 1958. It conformed to its predecessor in most respects incorporating such advances in the diagnosis of disease and causes of death as had been made since the sixth revision.

Basically the Classification as evolved by the sixth and seventh revisions is a compromise as it must be if it is to be accepted internationally. It is designed to be used by

doctors educated at different medical schools in different countries with different backgrounds over a period of more than fifty years of rapid progress in medicine and to meet the varying requirements of hospitals, vital statistics offices, medical services of the armed forces, social insurance organizations, sickness surveys and a host of other agencies as well as of the relatively or absolutely unqualified person who will apply it (in simplified form) in areas where there are no doctors. Attempts to provide a statistical classification based on a strictly logical arrangement of morbid conditions have hitherto failed and the Classification has accordingly had to effect a compromise between classifications based on etiology, anatomical site, age and circumstances of onset. As Farr observed: "The medical practitioner may found his main divisions of diseases on their treatment as medical or surgical, the pathologist on the nature of the morbid action or product, the anatomist or the physiologist on the tissues and organs involved, the medical jurist on the suddenness or the slowness of death, and all these points will deserve attention in a statistical classification."

The Classification has not only had to pay attention to these points but also to take the quality of the information available in medical reports into consideration. It is therefore not surprising that there has been criticism of some categories usually based upon disagreement regarding the etiology of some disease or its place in a certain group. With improved knowledge it is to be expected that in due course each disease or group of diseases will be classified in a way that commands international support.

Medical certificates of death: application of the Classification to causes of death

Early records of death usually mentioned only one cause but in the course of time it became recognized that two or more causes were often involved and that it was important to decide carefully which was the main one. Certain principles were laid down in the first revision of the International List of

Causes of Death and these were applied by the United States Bureau of the Census in a *Manual of Joint Causes of Death* first published in 1914 and afterwards revised to conform with successive revisions of the List. This manual was used by other countries as well. Rather more flexible rules concerning the cause or causes of death were applied by the General Register Office of England and Wales. The Fifth Decennial Revision Conference requested the United States Government to continue its investigations into the problem of multiple causes of death in co-operation with other governments and organizations and these investigations and the suggestions made led in due course to the approval by the Sixth Revision Conference of an International Form of Medical Certificate of Cause of Death and Rules for Classification³ which included a definition of the underlying cause of death.

The Rules for Classification observe that for the purpose of introducing public health measures to prevent the precipitating cause of death from operating "the most useful single statistic is that relating to the underlying cause of death which may be defined as (a) the disease or injury which initiated the train of morbid events leading directly to death or (b) the circumstances of the accident or violence which produced the fatal injury. The recommended form provides for

- I (a) Direct Cause (due to)
- (b) Intervening antecedent cause (due to)
- (c) Underlying antecedent cause
- II Other significant conditions contributing to the death but not related to the disease or conditions causing it"

These Rules for Classification give examples of how the certificate is completed as well as of improbable sequences in the train of morbid events and other errors and provide notes for the interpretation of entries of causes of death. Member States of WHO

pledge themselves under the WHO Nomenclature Regulations to adopt this death certificate and to ensure as far as possible that it is completed by an attending physician.¹¹ The Regulations also stress the need for protecting the confidential nature of the certificate during any administrative procedures. This is an important point and great stress was laid on it in papers read at the First International Conference of National Committees on Vital and Health Statistics in 1954 by Aubenque and Neurdenburg¹² the latter remarking that if there is no guarantee that confidentiality will be respected medical practitioners may be reluctant to make a precise and full report.

As already noted the WHO Centre for Classification for Diseases after consultation with several national statistical offices and after experimental trials drew up additional rules—the Supplementary Interpretations and Instructions for Coding Causes of Death and Medical Certification of Causes of Death—which were incorporated into the Rules for Classification in the 1955 revision of the Manual.

While specifying uniform and efficient methods of recording medical opinion as given in certificates of causes of death the 1955 Revision Conference formally recognized the difficulty that many national administrations would have in applying the relevant rules. One serious difficulty in many countries is the lack of medical practitioners to attend the sick and sign certificates. The Conference therefore recommended that WHO undertake a study of methods which could be used temporarily in specific areas as a substitute for the classical methods but would still furnish health administrations with useful information on the frequency and severity of specific diseases or groups of diseases. A series of regional statistical seminars have since initiated the search for and the experimental application of such method.

³ World Health Organization (1957) *Manual of Classification of Causes of Death*, 1st ed. Geneva, vol. 1, p. 33.

¹¹ World Health Organization (1957) *Manual of Classification of Causes of Death*, 1st ed. Geneva, vol. 1, p. 302.

¹² Aubenque M. J. (1954) *Bull. Wld Hlth Org.* 11: 63.

Neurdenburg M. G. (1954) *Bull. Wld Hlth Org.* 11: 51.

Another important step towards increasing international comparability was taken in April 1955 by the establishment in Caracas in the Ministry of Health and Welfare Venezuela of the Latin American Centre for the Classification of Diseases. The specific tasks of this Centre are to promote completeness accuracy and comparability of mortality statistics in Latin America by means of training courses and by serving as the clearing house for problems arising in the application of the Spanish edition of the *Manual of the International Statistical Classification of Diseases Injuries and Causes of Death*. By a decision of the WHO Regional Committee for South East Asia in 1958 another Centre with similar objectives is to be established in New Delhi.

Geographical limitations in international comparability

To ensure comparability of health statistics it is necessary not only to have an efficient administrative machinery for recording vital events and statistical services to compute and tabulate them but also an adequate number of competent physicians to diagnose causes of illnesses and deaths. But estimates made by the United Nations Statistical Office¹⁷ show that only 33% of the deaths occurring annually in the world are recorded and included in statistics: the proportion by continent ranging from 100% in Europe and North America to 39% in South America 18.2% in Asia and 13% in Africa. The proportion is as low as 8% in tropical and southern Africa and 7% in eastern Asia. The number of physicians available for certifying causes of death is even less than the number of lay registrars. It is not surprising therefore that the population covered by adequate statistics of causes of death is smaller still than that covered by crude mortality data.

Statistics of cause of death deemed worthy of reproduction in the latest issue of WHO's *Annual Epidemiological and Vital Statistics* cover a population of 682 millions in 50

countries or territories representing roughly 26% of the world's population.

The practical impossibility of applying standard statistical methods to most underdeveloped areas has been increasingly realized by WHO. The Expert Committee on Health Statistics has accordingly recommended that WHO concentrate its statistical activities in the coming years on the search for substitute methods capable of meeting the needs of territories in various stages of development. The possibility of securing comparable data has been explored at a series of international seminars and training centres in vital and health statistics organized in collaboration with the United Nations. Regional advisers in health statistics have further pursued this task by assisting national governments.

Co-operation with the United Nations

The definitions of live birth and foetal death adopted by the Third World Health Assembly as well as the International Classification have been included in the Principles for a Vital Statistics System adopted by the United Nations¹⁸. The United Nations is concerned with problems of demography and these Principles after adoption by the Statistical Commission of the United Nations Economic and Social Council were approved by the Council and forwarded to governments with the request that they review and appraise their procedures for registering vital events and compiling vital statistics taking into consideration the principles for a vital statistics system and introduce such changes as are feasible to improve national statistics and their national comparability in this field. The Principles cover the registration of vital events the recording reporting and collecting of data for statistical purposes and the compilation of vital statistics and were based on a survey of procedures in 58 countries. In their preparation the comments of the WHO Expert Committee on Health Statistics were taken into consideration. As a result the recommendations relating to

¹⁷ U. N. Stat. (1956) Demographic Yearbook 1956 New York p. 74.

¹⁸ U. N. Stat. (1953) Principles for a Vital Statistics System, 1953, New York.

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¹⁷ U.N. Stat. (1956) Demographic Yearbook 1956, New York, p. 75.

¹⁸ U.N. Doc. E/Conf. 26 (1953) P. 1, p. 1. (Stat. Yearbook, 1953, New York).

mentioned the serious drawbacks which may accompany the indiscriminate use of antibiotics. Although the latter can save lives in cases of bacterial complications—and even in these cases the antibiotics should be selected after identifying the micro-organism responsible—they are not indicated in cases of uncomplicated influenza occurring in persons normally in good health. The dangers of antibiotic resistance which may result from such injudicious treatment must not be minimized.

WHO influenza programme successes and possibilities for improvement

The abundance of the data brought together and discussed by the Committee is a proof of the value of the epidemiological services and the network of national influenza laboratories operating in liaison with the WHO sponsored World Influenza Centre and International Influenza Center for the Americas. Despite this the Committee did not conceal the shortcomings observed during the recent epidemic. In certain countries the dispatch of epidemiological information and of virus strains was unduly delayed and sometimes even neglected despite the realization that the epidemic was spreading on a large scale and that the new virus was responsible. National centres for the study of influenza have not been officially designated in all countries not because of any lack of laboratories capable of carrying out the necessary work of isolation and identification but owing to lack of organization. Thus there were regrettable gaps in the network of information and of laboratories in relation with WHO which to be effective must be world wide. The epidemic had in fact already been raging for several weeks before it was reported. This was because it commenced in areas of Asia which do not participate in WHO programmes and do not collaborate with the epidemiological information services. In this way two months were lost during which arrangements could have been made to combat the epidemic more effectively than was actually found possible. For although it is impossible to foresee the

origin of an epidemic or what will be its extent and severity public health measures—if taken in time—can nevertheless limit its effects.

Other respiratory viruses

The discovery in 1953 in an adenoid culture of certain cytological changes caused by a virus until then unknown opened up a new chapter in human virology.

Thus and other viruses of the same family were named "adenoviruses" after the tissue in which the original virus was found. Since their discovery at least 18 serological types have been isolated. They are found in the respiratory tract from the nose to the lungs and also sometimes on the eye or in the intestines. They cause cellular changes in all these parts of the organism leading to inflammation and hypertrophy of the corresponding lymphatic tissues. Fever, pharyngitis and coughing are the main symptoms to which may sometimes be added coryza, lymphadenopathy, headache and myalgia. Some of these viruses also cause follicular conjunctivitis and epidemic keratoconjunctivitis. Their spread is favoured by communal life. They are often found among members of the armed forces in the United States and the United Kingdom more often in winter than in summer. They are more uncommon among the civil population but epidemics sometimes arise in child communities. They do not spread through the air only. They may be excreted in stools over long periods and so transmitted as enteric viruses; they have also occasionally been transmitted by water in swimming pools and lakes.

These viruses form a group with a common soluble antigen. However they can be distinguished from one another by antigenic factors which can be differentiated by serological tests. They have been given the serial numbers 1, 2, 3, 4 etc. Some types are found more frequently among children others predominate in military camps.

These viruses grow well only in tissue cultures of human cells either normal or malignant (HeLa KB for example). Animal tissues are generally unsuitable for their culture although adaptation of certain

generally minor except in 1946-1947 when the A1 virus first appeared and in 1957 when the A2 virus—differing more sharply from viruses isolated during previous epidemics than the latter viruses differed among themselves—appeared in the Far East. In all probability this virus will remain the dominant type in coming years. The mechanism of antigenic variation so evident in the type A viruses and less appreciable in the group B viruses seems to be based on a natural lability coupled with the forces of selection tending to ensure survival of the virus. It is as though the virus on encountering an environment which is partially immune following previous epidemics brings into play hitherto latent potentialities which enable it to survive for a certain period. Thus the A1 and A2 types have succeeded one another during the last twenty-five years. They all have a soluble group-specific antigen in common but have different virus antigens as shown by the haemagglutination test. These differences are sometimes such that the antibody produced as a response to one virus affords hardly any protection against the others as in the case of the A1 and A2 viruses.

The variability of the influenza viruses complicates the problem of vaccination. It might be thought that the inclusion of the largest possible number of antigens in the vaccine would ensure reasonably reliable protection. However the forces of selection seem to thwart these theoretical precautions and the appearance of previously unknown antigens renders them ineffective.

It is part of the role of the World Health Organization Influenza Centres to follow up closely all over the world the antigenic evolution of the influenza viruses which remains a major epidemiological mystery.

Experiments in a number of countries have shown that vaccination has reduced the incidence of the disease by two-thirds. To be effective it should be carried out at least two weeks before influenza becomes epidemic. The vaccine will naturally contain the virus causing the epidemic which would be at present the A2 virus. It has also been considered advisable to include an A1 strain for

this virus may still be responsible for certain cases. Some workers have suggested broadening the composition of the vaccine still further by including an A strain, a swine influenza strain, a B strain isolated after 1953 and even a Lee 1940 strain. In the light of the experience of the last thirty years the antigenic make-up of the influenza virus changes to a notable extent only every ten or fifteen years. It is thus probable that vaccines prepared with known strains will confer satisfactory protection during the next few years.

There can be no question of vaccinating the whole population. The cost of this measure would be disproportionate to its practical value. It is clear that certain groups will have priority: those occupying key positions in the general and social services and in branches of industry where mass absenteeism would have serious economic repercussions. In the event of serious epidemics the age groups most threatened should also be vaccinated.

Vaccination is recommended furthermore for expectant mothers and for children and adults suffering from cardiovascular, renal and pulmonary diseases or diabetes. During the 1957 pandemic in fact pneumonia was caused by the influenza virus mainly among persons suffering from chronic pulmonary congestion following a cardiac complaint or those in an advanced state of pregnancy. Despite its evident pneumotropism the 1957/1958 virus was relatively mild and caused only a low mortality. It is none the less true that primary pneumonia caused by the influenza virus is of major importance and should be carefully watched for and studied. Cases should be immediately reported to the national influenza centres.

During the last ten years a live influenza vaccine has been administered in the USSR with—its advocates report—results as satisfactory as those given by the formaldehyde-inactivated vaccine used elsewhere. Workers in the USSR have also advocated serotherapy by the intra-nasal route using hyperimmune horse serum.

No specific treatment for influenza has been discovered in recent years. The Committee

emphasizes—must be studied in their full demographic epidemiological social and medical setting

This great increase in the number of the elderly and the old is a new situation in the history of the world and has aroused much speculation and many fears. There is a widespread feeling in highly industrialized nations that the economic burden of looking after the aged will rapidly become more serious as more and more become dependent. In fact the proportion of dependent individuals is unlikely to undergo any important change at least for some decades. The view is also widely held that medicine is keeping alive a number of decrepit old people who have no useful role to play in the community. An inquiry in Sweden however reveals that the proportion of invalids in old age has declined progressively in the past three or four decades.

Yet another common belief about the old is that the growing burden they place upon hospital and welfare services has been created principally by the withering away of family affection and the general disintegration of the family group. This has been shown by careful studies in the industrialized countries to be largely untrue. But social and industrial changes lead to movements of the people and there is a steady drift to the towns (not only in the industrialized but also in the less developed countries) so that many elderly people are left behind to fend for themselves.

A minority of the aged in the community never precisely measured but certainly substantial suffer from poverty loneliness infirmity and a greater or lesser degree of mental ill health. In the USA for example the figures for first admission to a mental hospital for all forms of mental illness are 2.3 per 100 000 population for under 15 years 93.0 in the age group 35-54 but 236.1 for those of 65 years of age and over. In Sweden there are 9000 cases of senile psychosis in a population of some 7 000 000. In most countries with statistics suicide rates reach a peak in old age. Admissions of the old into mental hospitals have also been increasing in recent years more than pro-

portionately to the increase in the number of the aged. Among the reasons for this are undoubtedly the gradual disappearance of the stigma attached to mental hospitals and the improvement in treatment but these are not the only reasons. The incidence of senile psychosis has not increased so it would appear that other factors are concerned such as the greater attention paid to some forms of mental disorders in old age (for example the affective psychoses) or the tendency in some countries to admit members of the lower income groups to the mental hospitals in large numbers. An important factor is the deterioration in the conditions favouring the care of the aged in the community.

Statistical data on mental health in old age are lacking in the more developed countries and not surprisingly are practically non-existent in the less developed countries. But judging from one investigation in Asia the more serious forms of mental illness in the old are not absent from the less developed countries either.

Causes of mental ill health in the aged

The factors influencing the appearance of mental ill health in the aged are manifold. They include economic and social factors poverty one of the most striking and universal features of their condition retirement often when they are still mentally and physically fit for work, leading frequently to a loss of dignity and status and sometimes to a feeling of being unwanted of emptiness and utter boredom and isolation often a source of great unhappiness. There are psychological and psychopathological factors maladjustment to life in youth and middle age the effects of physical mental and emotional decline. There are physical factors heredity metabolic and endocrine deficiency the effects of nutritional deficiency and infectious disease in childhood complications arising from diseases first appearing in middle age infirmity accidents cerebral degeneration disease originating in old age outside the central nervous system isolation

adenovirus types to monkey kidney cell culture has been accomplished with difficulty. A considerable time may elapse before recovery of the virus is achieved since adenoviruses apparently go through a long growth cycle before their presence is revealed by cytopathic changes in the cultures. The report includes technical details on the isolation of these viruses as well as on serological diagnosis by the complement fixation and neutralization tests.

Bivalent or trivalent vaccines containing two or three types of adenovirus have been prepared on monkey kidney cells and treated with formaldehyde. When administered intramuscularly to members of the armed forces who are particularly liable to infection by adenoviruses the vaccines led to a decrease of 55.81% in the incidence of acute respiratory illnesses as a whole and of 90% in that of diseases caused specifically by adenoviruses. Vaccination is therefore indicated in barracks and military camps. In 1957 the Federal Register of the United States of America published information on the commercial manufacture of adenovirus vaccine.

A certain number of viruses have been isolated which cause atypical pneumonia and among children in particular illnesses some times reminiscent of influenza. Examples of such viruses are the Sendai virus of Japan, the CA virus (associated with croup) and the haemadsorption viruses HA 1 and 2³.

None of the numerous viruses isolated in recent years can be reasonably regarded as the cause of the common cold which remains one of the most baffling problems in human virology.

* * *

The report concludes with a series of technical annexes. They deal in particular with methods for the preparation of sera for the typing of influenza strains, techniques for influenza diagnosis and the use of complement fixation in the typing of the influenza virus.

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Mental health in old age*

During the nineteenth century the effects of the Industrial Revolution in increasing wealth and of advanced medical knowledge in reducing the toll of disease were widely felt in western Europe. The birth rate remained high but the death rate gradually fell and the net result was a rapid increase in the population. At the beginning of the twentieth century a steep decline in the birth rate set in and as the death rate continued to fall the relative proportion of the aged began to rise. In some Asian countries the demographic pattern is much the same today as it was in western Europe in the nineteenth century with a falling death rate and a high birth rate. In parts of Africa and elsewhere however the pattern is still one of both high death and high birth rates.

As yet no country can be said to have reached an equilibrium of low death and low birth rates but a number of countries are approaching this position and others may be expected in time to move towards it. Its characteristic feature is the higher proportion of older age groups in the population.

This increasing preponderance of the aging and aged at a period in world history of much social and economic unrest raises many problems in a variety of spheres. Not the least are the mental health problems of aging and the aged which are discussed in the sixth report of the WHO Expert Committee on Mental Health which has just been published.¹ These problems—the report

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A comparatively small geriatric unit with full hospital facilities and no formalities for admission can cater as has been shown in Amsterdam for the acute psychiatric and indeed geriatric problems of the great majority of old people in a large population. Here the diagnosis can be made the etiology fully investigated and most patients treated and returned to active life. But there is also a need for independent geriatric hospitals existing medical and psychiatric services do not cater fully for the problems and needs of the aged which have hitherto been unduly neglected by the medical profession. For some elderly persons there should be day hospitals caring for and treating them during the day but returning them to their relatives at night for others long stay hospitals without the full facilities of general hospitals but providing long term treatment nursing care and particularly rehabilitation activities for yet others residential homes with a minimum of rules and regulations and a genuine home atmosphere and finally mental hospitals for those melancholic patients who are suicidal or those with paranoid psychoses of relatively long duration or those with confusional states or dementias with acute excitement. These hospitals all require proper staff and facilities and there should be provision for follow up and after

care services planned in close co-operation with the family doctor.

These services would make a heavy demand on the resources of the community but this is inevitable if many old persons are not to drag out the rest of their lives in squalor and misery. Apart from their justification on grounds of humanity they would in any case if planned in harmony with the modern principle of community care probably mean a saving in the long run.

Treatment and rehabilitation

Psychotherapy in old age is more important than used to be thought. It should be directed towards the patient's current problems and perplexities helping him find ways of being useful supporting him in his search for independence and encouraging him to expand and strengthen his personal relationships. A high proportion of cases of endogenous depression respond to electroconvulsive therapy (ECT) a form of treatment which may also be of use in some cases of paraphrenia or occasionally in the depressive reactions of arteriosclerotic psychoses.

Some of the new psychotropic drugs may provide a valuable alternative to ECT for the depressions of old age and those of the ataractic group while not affecting the long term course of arteriosclerosis and senile dementia do produce systematic improvement and enable many patients with senile decay to live in hostels or even at home rather than in mental hospitals. Particularly in confusional states a peaceful stable environment is needed for the patients and every effort should also be made to provide the opportunity for them to re-establish human contact. Rehabilitation should be planned on the basis of a careful psychological and vocational as well as psychiatric and physical assessment of the patient's needs and capabilities. Whatever the form of treatment adopted close co-operation between the specialities a domiciliary conference bringing together the family doctor the psychiatrist and the social and welfare worker and full liaison at all points with the family doctor are of the greatest importance.

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The promotion of mental health in old age

A reasonable degree of economic security and adequate provision for the care of their general health are essential prerequisites of mental health in the aged. Retirement policies should be revised to allow those capable of work to continue in it and those not fully capable to have part time employment. Special employment services would be useful with carefully developed systems of vocational guidance. The old should have the benefit of legal consultation services to help them with such matters as tax returns. A system of family helpers and of social activities such as clubs would minimize their fear of becoming dependent. The planning of new satellite towns and communities should allow for the preservation where possible of the larger family groups. Measures to prevent or to deal adequately with chronic respiratory disease hypertension and cardiovascular disease and to provide appliances to increase mobility and reduce sensory defect would probably help reduce certain mental health problems of later life and should be co-ordinated by a single authority. Education and preparation for aging should begin at an appropriate time long before retirement and before the individual begins to be haunted by fears of old age.

Classification and prognosis of mental disease in old age

Mental diseases in old age are broadly classified by the Committee into affective psychoses paraphrenias confusional or delirious states senile psychosis arteriosclerotic psychosis primary pre senile dementias secondary pre senile and senile dementias alcoholism and neurosis and each of these conditions is discussed. Delirious states particularly but some of the others as well

may be due to physical disease and may be alleviated by treatment. Important causes are cardiac failure acute respiratory infection operations dehydration and electrolyte disturbances anemias malignant disease and vitamin and nutritional deficiencies. Causes often overlooked are the silent pneumonia of the aged slowly developing prostatic obstruction and pulmonary tuberculosis. Nutritional disturbances are common the apathy depression and failing energy of the old often leading them to subsist on a bare monotonous diet deficient in proteins vegetables and fruit. It is of obvious importance to distinguish between what is and what is not due to organic disease.

A relatively high proportion of these mental disorders are curable as has been shown by recent experience and provided medical attention is given early successful reintegration into the community is obtainable.

Organization of geriatric mental health services

In terms of hospital beds it would be impracticable to consider the care of even a fraction of the aged who have become mentally infirm or ill. But even if there were an adequate number of beds it would be far better for the aged to be treated at home if they must go to hospital for treatment they should be allowed to return home at the earliest opportunity. There is a growing emphasis on the importance of the social environment as a factor in mental health a growing realization that uprooting an individual may in the long run hinder his return to the community just as much as illness. The Committee concludes that only by extending facilities for care beyond the bounds of the mental hospital can the health problems of the aged be solved.

An adequate geriatric health service should be so co-ordinated as to be able to assess and investigate all cases from the beginning to provide them with the necessary social and domiciliary support or hospital treatment or to place them in the institution best suited to their needs. The form of organization will

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With reference to this annex the report makes clear the distinction between international standards and international reference preparations the former category

containing only those preparations to which an international unit has been assigned on the basis of an international collaborative study

Notes and News

Viability of BCG vaccine and tuberculin allergy

For practical and economic reasons it is difficult for workers in BCG laboratories to estimate the efficacy of each batch of BCG vaccine on the basis of post vaccinal tuberculin reactions. Various methods of testing *in vitro* have therefore been studied of these counting the number of viable bacilli in a given quantity of vaccine is at present regarded as one of the most useful.

It is now admitted that the production of both allergy and immunity depends largely upon the viability of the bacilli in the vaccine. Nevertheless few statistical studies have as yet been published on the possible relationship between the number of viable bacilli and the allergenic potency of the vaccine and their results have been scarcely significant owing to lack of uniformity in the experiments and the absence of any satisfactory criterion.

New and strictly controlled experiments have therefore been carried out by a group of Japanese scientists and the results have just been published in detail in the *Bulletin of the World Health Organization*.

In the first experiment 8 kinds of dried vaccine were inoculated into 3078 children and the post vaccination tuberculin reactions were examined after 1, 3-4 and 12 months. The strength of the reactions was assessed in terms of the mean size of the erythema with Old Tuberculin (OT).

In the second experiment 45 kinds of dried vaccine were inoculated into 1711 children and the tuberculin reactions were examined after 4 and 12 months. The strength of the reactions

was assessed in terms of the mean size of the erythema with OT and of the induration with purified tuberculin (PPD).

In both experiments a definite positive correlation was found between the number of viable units in the vaccine and the size of the post vaccinal tuberculin reaction. This correlation was always observed up to 12 months after vaccination i.e. 9 months longer than in previous studies by the same authors.

It is worth noting that the correlation between viability and post vaccinal reaction holds good for both types of tuberculin employed (OT and PPD) and for both the culture media used for determining the viability of the vaccine (Ogawa and Lowenstein-Jensen). Needless to say this correlation is subject to certain restrictions. For example it can be expected only when the degree of bacillary aggregation is similar for each batch of vaccine and when the same strain of BCG is used.

If the borderline of viability is drawn at 10 colonies in 10 mg of vaccine the mean size of the tuberculin react on after 12 months will be 15 mm or more with OT and 13 mm or more with PPD which is considered evidence of a sufficiently strong tuberculin allergy. When a vaccine contains more than 10 viable units in 10 mg, tuberculin positive conversion rates of the order of 90% may be expected.

Recent experiments have shown that glutamate vaccine may be preserved at refrigerator temperature for several years without losing its effectiveness. There is thus sufficient time to carry out culture tests on vaccines before use. If these tests are carried out on each vaccine after it has been subjected to some kind of heat treatment it will be possible to foretell to some extent, the

A proper geriatric service cannot be envisaged unless doctors and nurses are properly trained both during their student years and by refresher courses to deal with the health problems of the aged. No less important is the education of the staff of the public health departments welfare authorities residential homes and voluntary agencies concerned with the aged. The establishment of institutes of gerontology would hasten the advance of knowledge in the field.

provide a powerful stimulus to workers in it and help set a high standard of clinical endeavour and inquiry WHO could play a great part in facilitating communications between such institutes in different countries and by organizing international study groups and symposia. Much investigation remains to be done in connexion with the mental health of the aged however and the Committee ends its report by outlining what it regards as the important areas of inquiry at the present time.

Biological standardization *

In the twelfth report of the WHO Expert Committee on Biological Standardization¹ steps are envisaged for making reference preparations of important antibiotic substances available as soon as possible after they have been shown to be clinically safe and effective. The Committee therefore established international reference preparations of neomycin, nystatin, novobiocin and oleandomycin, and considered the establishment of international reference preparations of a number of other antibiotics including the new antistaphylococcal antibiotics kanamycin, leucomycin, ristocetin and vancomycin. It noted that the Second International Standard for Streptomycin has been established. Authorization was given for the establishment of an international reference preparation of human menopausal gonadotrophin and of the urgently needed Third International Standard for Corticotrophin, the Fourth International Standard for Insulin and the Second International Standard for Heparin have now been established.

The Committee considered various reports relating to the establishment of international reference preparations and international standards for vaccines and sera and noted that recommendations had been made for collaborative studies on methods of testing the potency of poliomyelitis and cholera vaccines. A collaborative study of freeze-dried type specific antipoliomyelitis sera has been completed and international reference preparations of these sera were established. The International Standard for Syphilitic Human Serum has been established and the International Unit defined. Also 19 international reference preparations of type specific anti *Leptospira* sera have been made available.

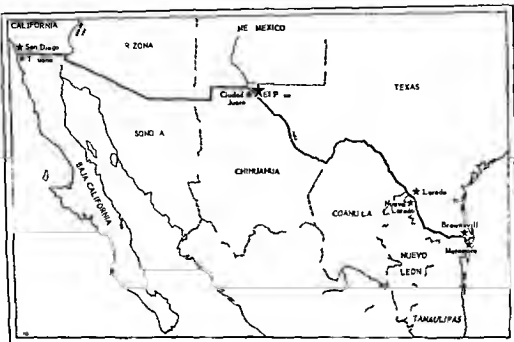
The Committee studied the recommended requirements for manufacturing establishments and control laboratories for polio myelitis vaccine for yellow fever vaccine and for cholera vaccine as drafted by several study groups and agreed that these represented satisfactory formulations of the requirements which should be fulfilled in order to ensure the reliability safety and potency of important biological preparations.

Continuing former practice the report is supplemented by an annex listing all international standards and international reference preparations held for distribution at the International Laboratories for Biological Standards in Copenhagen and in London.

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UNITED STATES-MEXICO BORDER



environmental sanitation (c) to stimulate the organization of community health councils in adjacent border towns for the solution of problems of common interest (d) to facilitate exchanges of information on health problems between health officers of adjoining border communities (e) to make available appropriate educational material including health education literature in Spanish to border communities (f) to serve as a clearing house for information on training needs and facilities and (g) to give support to the United States Mexico Border Public Health Association. The present staff of the Office consists of a medical officer who is Chief of the Office a rabies adviser and two clerk stenographers. Provision has been made for the appointment of an administrative officer in 1959 and a sanitary engineer in 1960.

The Chief of the Field Office at El Paso is also Executive Secretary of the United States Mexico Border Public Health Association which is sponsored by public health officials of both countries and partly financed by PASB. The

Association holds annual meetings to allow public health workers on both sides of the border to exchange ideas and to correlate their work.

Rabies is a serious problem in the ten Mexican and United States border states particularly in Texas. In 1958 PASB assigned a veterinary public health consultant to the rabies control programme of the El Paso Field Office. A survey of the rabies situation in the border area and preparations to deal with it have been made. The Office has also supported a predatory animal control demonstration held by the local livestock association in Nuevo Casas Grandes Chihuahua Mexico.

Each year a considerable number of Mexican immigrant agricultural workers are rejected at US Immigrant Reception Centres because of tuberculosis. Early in 1958 a meeting between United States and Mexican public health authorities and representatives of PASB discussed tuberculosis control problems, and agreed to establish a form for the intercountry reporting of tuberculosis.

intensity of the tuberculin allergy induced by vaccination

In the opinion of the authors this method of determining vaccine potency by counting viable bacilli should be included in the routine laboratory assay of BCG vaccine

Potency test for poliomyelitis vaccine

The determination of the potency of poliomyelitis vaccines by means of animal tests is a long difficult and costly process and not always a reliable one. Increasing attention is therefore being paid to *in vitro* tests for this purpose. The test described by Matilda Benyesh-Melnick & J. L. Melnick in the *Bulletin of the World Health Organization*¹ is an adaptation of a process proposed in 1955 and progressively improved since then.

This test is based on the measurement of the capacity of an inactivated virus in tissue culture to bind neutralizing antibody. The potency of the vaccine is measured *in vitro* by the degree of neutralization of a given quantity of virus added to a mixture of vaccine and serum which has been incubated for some hours.

The test is type specific and the antigen-antibody combination is irreversible. Vaccines containing preservative yield the same potency titres as untreated vaccines. The test gives reproducible results; they do not always agree with those obtained in animal potency tests which are more subject to variation. Dried vaccines retain their complement fixing activity but lose their power to combine with neutralizing antibody *in vitro* and to produce neutralizing antibodies *in vivo*—a finding which suggests that the test measures *in vitro* the antigen responsible for antibody production *in vivo*.

The test would seem to have immediate application in the selection of vaccine lots to be incorporated into the monovalent pools. Rather than pooling lots by chance alone, only vaccines of desired potency could be used or vaccines of low potency could be pooled only with those of high potency. Another application would be in the periodical testing of vaccines during storage; this would help to determine whether the present date limit for use (6 months after release) has been properly selected.

The Fourth International Standard for Insulin

The Third International Standard for Insulin is now almost exhausted and a Fourth International Standard has accordingly been established to replace it.² To meet demands it was decided to prepare a quantity of 1 kg of crystal line insulin which involved the pooling of contributions from 13 laboratories in 7 countries. The starting material contained 52% bovine and 48% porcine insulin. After the first purification process analysis showed the presence of protamine splitting enzyme but this was eliminated after further purification.

The final yield was distributed into ampoules each containing 110-125 mg of crystals. The ampoules were sealed in air and it is recommended that they should be stored at or below 0°C.

The potency of the substance was established by an international collaborative assay in which 20 laboratories in 8 countries took part. One mg of the substance contains 240 International Units. The International Unit is thus defined as the activity contained in 0.04167 mg of the Fourth International Standard preparation.

Health in a border area

Mexico and the United States face each other across a 2000 mile border. Through its El Paso (Texas) Field Office the Pan American Sanitary Bureau (PASB) which serves as the WHO Regional Office for the Americas has succeeded in promoting co-operation between health agencies on both sides of this border.

The El Paso Office was established in 1947 primarily to help the United States and Mexico carry out a practical co-operative programme for the control of venereal diseases. The project was subsequently expanded to include a wider range of health activities.

The basic programme of the Office is (a) to co-ordinate health activities along the border and promote increased contact between health officers of adjacent communities; (b) to intensify co-operation in the control of rabies, venereal disease, tuberculosis, malaria, typhus and the rickettsial diseases; and in maternal and child health, public health education, nursing and

student may perform further practical work in a subject chosen in accordance with her interests and abilities. The new curriculum was introduced in 1957 so that the third year course is now being tried out for the first time.

Teaching of biostatistics in medical schools

The teaching of biostatistics in medical schools was the subject of discussion at a meeting held in San Luis Potosí, Mexico, from 11 to 15 August 1958 by the Bureau of Experimental Studies in Public Health, Mexican Ministry of Health and Welfare, and the Faculty of Medicine of the Autonomous University of San Luis Potosí with the collaboration of the School and Institute of Hygiene and Tropical Diseases and of the Pan American Sanitary Bureau which serves as the WHO Regional Office for the Americas. The report of the meeting which was attended by professors from medical schools in Guatemala, El Salvador and Mexico was recently published in pamphlet form by the Bureau of Experimental Studies in Public Health.

The participants divided into three working groups discussed the following subjects: the need for statistical instruction in medical schools; curricula and teaching method; and the administration of teaching programmes.

It was concluded that the medical student and the physician need increased statistical training for the correct application of the scientific method for the critical judgment of quantitative phenomena and for better understanding of social medicine. The final year medical student who in Mexico spends part of his time in medical practice in a rural area, should know how to use the statistical data available on the area in which he serves and how to process and present data obtained personally in the course of his work. The fully qualified physician requires sufficient statistical knowledge to evaluate his own professional activities and the medical literature and to guide him in research.

The minimum content of courses for more advanced students and physicians was outlined. Various methods used in the teaching of elementary statistics, statistical methodology and applied statistics were evaluated, those requiring active participation by the students such as practical exercises, discussion groups, team work and field visits were especially recommended.

It was also recommended that the teaching of biostatistics be carried out throughout the medical curriculum both as a separate subject and combined with courses in other subjects such as physiology, pharmacology, bacteriology, pathology, clinical medicine and legal medicine. The staff should include a full-time medical professor with sufficient statistical training to provide advisory services. Suitable premises for practical exercises, seminars, etc. would be needed and other requirements include furniture, drawing equipment, slide rules, a calculating machine and local, regional, national and international bibliographical material. The possibility of using personnel and facilities of hospitals, other health services and the civil registration offices would be a great advantage.

BCG vaccination in Chile

Last year the mass BCG vaccination campaign in Chile came to a successful end after two years of activity. The Chilean Government was helped in the campaign by the Pan American Sanitary Organization (now the Pan American Health Organization) which acts as the regional organization of WHO in the Americas and by UNICEF.

In 1951-1952 an intensive BCG vaccination campaign was carried out in all Chilean towns of more than 5000 inhabitants; another campaign covered the northern provinces. The 1956-1958 campaign was designed to cover an area extending from the Province of Coquimbo in the north to Llanquihue in the south and including 75% of the country's rural population (see map). The most southerly part of the country was excluded because of its sparse population and transport and communication difficulties.

In 1955 the necessary preliminary information for the campaign was collected, detailed plans were made, personnel were trained and propaganda was started. The staff for the campaign included a Chief Medical Officer in charge of the technical and administrative aspects, a Medical Deputy Chief in charge of the field work, a nurse assigned by the National Health Service, 4 health educators and 19 vaccinators. WHO was asked to supply a nurse educator who joined the project in April 1956. The actual campaign was preceded by a two-month period

From the beginning the El Paso Field Office has concentrated on the control of venereal diseases. As a result of its work these diseases are today a relatively minor problem in the area it serves. The Office is expanding its work to deal with other major public health problems in the area.

Nursing education in Ecuador

Like many other countries Ecuador needs more and better trained nurses particularly for work in rural areas. Since 1955 the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas has been helping the Government of Ecuador to develop the training of nurses and auxiliary nursing personnel.

There are two schools of nursing in Ecuador one at Guayaquil on the coast and the other at Quito in the mountains. The hot humid coastal region does not attract students from the highlands on the other hand students from the coast do not take readily to the high altitude of Quito. Taking account of these factors and of the dearth of nurses in the coastal area it was decided to strengthen the school at Guayaquil. This school which is attached to the Medical Faculty of Guayaquil University was founded in 1929. Yet between 1931 and 1955 it graduated only 64 nurses as compared with 224 nurses graduated from Quito. Of this total of 288 nurses 177 were employed in 1955 or only one graduate nurse for every 20 850 inhabitants.

The plan for the improvement and expansion of the Guayaquil School drawn up with PASB assistance depends on the co-operation of non-governmental agencies employing nursing personnel. This is a policy now being followed in PASB assisted nursing programmes throughout the Americas. Until recently non-governmental organizations and even the professional associations had little influence on the training of nurses which was exclusively a government concern. The programmes now under way seek to unite both governmental and non-governmental health and medical resources. As a result associations campaigning against diseases such as cancer and tuberculosis now contribute to the financing of schools of nursing on a quota basis their contributions being proportionate

to their use of professional nurses for their work.

The request to PASB for international assistance in improving nursing education recognized that the number of nursing and medical instructors had to be increased the curriculum had to be revised and extended and facilities for practical work had to be developed. In addition the educational requirements for admission needed to be raised.

As part of the plan for the Guayaquil School of Nursing an experimental three year programme of instruction is being tried out. The school year has been increased from 32 to 44 weeks beginning on 1 April and ending on 31 January. Forty four hours a week are devoted to instruction. The student's responsibilities are gradually increased and her progress is evaluated periodically and discussed with her. Theoretical and practical courses are closely co-ordinated.

The first year of the course is divided into a four month preliminary or trial period and the first clinical period. During the preliminary period the aptitudes of the students are assessed and practical and theoretical training in basic nursing is started. The first clinical period includes practice in the care of patients with contagious diseases at hospitals and in techniques of vaccination at health centres. At the end of the first year students are assigned in rotation to work in the operating room. Classroom instruction in the physical and biological sciences the social sciences and nursing techniques is given throughout the year.

The second year of the course stresses the home and the community and includes instruction on the growth and development of the child. The year opens with two months theoretical instruction and supervised practical work in medical and surgical specialties. The rest of the time is devoted to obstetrics and paediatrics with four weeks training in public health nursing. Classroom instruction continues as in the first year with the addition of a course in the medical sciences.

The third year course includes practical experience in urology cardiology dermatology psychiatry and public health and in ward instruction supervision and administration. Educational theory is added to the programme of classroom instruction. During the last five weeks each

the tuberculin test was administered by the vaccination auxiliary. Before the work of re-testing the two nurses made comparative readings of tuberculin tests in order to equalize their reading methods.

The interval between vaccinations and re-testing varied considerably from one province to another ranging from 10 to 6½ weeks. The Mantoux 5 TU test was also used for re-testing the stock solution was provided by UNICEF and the final dilution for use in the Mantoux test was prepared by the Santiago Bacteriological Institute.

Demonstrations of the techniques used in the campaign were given to midwives and nurses at health centres. The nurses also studied the organization of the programme and took great interest in the field work.

During the campaign approximately 1 031 500 persons were tuberculin tested. 959 745 tests were read and 502 85½ had negative results. A total of 501 665 persons were vaccinated with BCG.

Despite transport difficulties particularly during the rainy season the campaign was completed to schedule and plans are now being made for the work of testing and vaccination to be carried on by the staff of the health centres.

The mental health of the subnormal child

Formerly "dullness" among children often passed unnoticed but it has now come to the fore as a result of compulsory education the complexities of town life and the need to learn industrial jobs quickly. Nevertheless little has yet been done to give the subnormal child the opportunity of developing his potentialities to the full. In school he is often more backward than need be and later in life he may present serious problems that could have been avoided had he been properly cared for in childhood. A backward child may also create difficulties for his parents and his brothers and sisters in many cases the families of such children need help and guidance.

The first European seminar on the mental health of the subnormal child was held in Oslo in 1957 under WHO auspices it dealt with general aspects of the subject, including the place of subnormal children in modern society and in institutions problems associated with

diagnosis treatment and training, and social work among the families of subnormal children. A second seminar on the subject convened by the WHO Regional Office for Europe was held in Milan Italy from 19 to 30 May 1959 it was attended by paediatricians psychiatrists psychologists teachers and social workers from 22 European countries and its discussions were restricted to consideration of the milder forms of subnormality among children.

Specific topics reviewed by the Milan seminar included the epidemiology of subnormality including principles of investigation, prevalence criteria and types of subnormal children the value and practice of team work in the treatment of subnormal children with reference to the respective roles of the psychologist, the social worker the paediatrician the psychiatrist and the educator practical principles of case finding and the organization of preventive and therapeutic services.

Nutrition problems in Africa

The lack of balance in the diets of most African populations and its disastrous effects particularly on the health of children, have long been a source of concern to a number of international and intergovernmental organizations. The latest in a series of efforts towards a solution of nutrition problems in Africa was a seminar held jointly by the Belgian Government, WHO FAO and the Commission for Technical Co-operation in Africa South of the Sahara (CCTA) in Lwiro near Bukavu Belgian Congo from 18 to 29 May 1959.

The seminar was intended particularly for persons who had attended the WHO/FAO-sponsored nutrition courses for health workers in Africa held in 1957 1955 and 1957 and had since carried out nutritional studies in their respective countries and territories. The participants were thus in a position to compare data on the nutritional levels of the various African populations and to pool experience of nutrition work and research in various parts of the continent in an attempt to solve common problems.

Smallpox survey in the Eastern Mediterranean Region

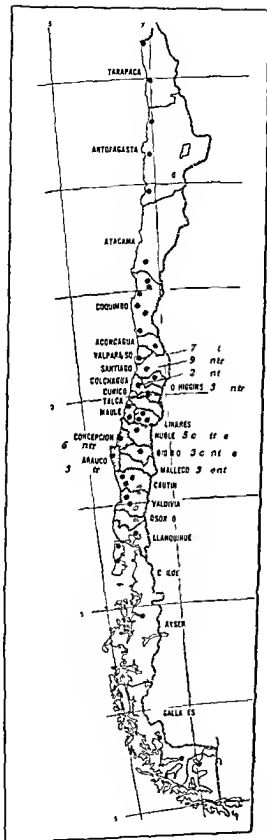
A survey of antismallpox measures in the Sudan Saudi Arabia, Ethiopia Eritrea the

The main objects of the campaign were to administer tuberculin tests to 60% of the rural population (from 0 to 30 years of age) to vaccinate negative reactors with BCG to re-test vaccinated persons and study the pre and post vaccination allergies to instruct doctors and nurses in tuberculin testing techniques and at the end of the campaign to incorporate these activities in the tuberculosis control programmes of the local health centres.

Before work began in each province meetings were held at which the aims of the campaign were explained to the local authorities. The four health educators then aroused the interest of the public by talks and film shows.

Tuberculin testing was carried out in the first three days of each working week and vaccination in the last three days. The single Mantoux 5 TU tuberculin test was used and reactions of 5 mm or more were classified as positive. For vaccination a dose of 0.1 mg of BCG organism in 0.1 ml of diluent was used. All the vaccine was prepared by the Bacteriological Institute of Santiago one of the laboratories producing BCG vaccine which meets internationally accepted standards of safety and potency. Both tuberculin and vaccine were delivered in dark ampoules and stored in refrigerators. The teams transported the tuberculin and vaccine in ice filled thermos flasks. To shield the ampoules from the light when in use they were covered with dark paper cups. Vaccinations were always performed indoors or in shaded arcades.

The re-testing of vaccinated persons was carried out in 10 provinces by the National Health Service nurse a vaccination auxiliary specially trained for the purpose and the WHO nurse consultant. The reading of scars and reactions was done by one of the two nurses.



- *Health centres performing BCG vaccinations*

☐ Area included in and covered by the rural BCG campaign between February 1956 and December 1957

Area included in and covered by the campaign between January and March 1958

☐ Area excluded from the rural BCG campaign

training of sanitary engineers

Dr Ronald T. McLaughlin of Canada, will take up his duties as WHO Professor of Sanitary Engineering at the University of Bangkok in September 1959. He will advise the Government of Thailand in the development and organization of the Sanitary Engineering Department of the University. Dr McLaughlin who studied civil engineering at Queen's University Kingston Ontario was Research Fellow in Engineering at the California Institute of Technology prior to his new appointment.

Psychiatric nursing in Iran

With WHO assistance the Iranian Government is undertaking a long term programme for the comprehensive nursing care of mental patients and the training of psychiatric nurses. Miss Evelyn Zimmerman a WHO nurse educator will assist the Iranian Government in planning and developing the programme. She will also teach psychiatric nursing and the mental health aspects of basic nursing at the Red Lion and Sun School of Nursing, Rey Teheran.

Miss Zimmerman was educated at Teachers

College, Columbia University New York where she was awarded degrees in public health nursing and psychiatric nursing. She has served in senior nursing capacities with the United States Army and spent four and a half years with the United States International Co-operation Administration (ICA) in Panama, where she trained nurses for administrative and teaching posts in psychiatric nursing.

Regional appointment

Dr Tigani el Mahi who has been appointed Medical Officer in charge of Mental Health at the WHO Regional Office for the Eastern Mediterranean, is a leading authority on mental health being particularly well known for his extremely successful reorganization of the mental health services in the Sudan. After receiving his medical degree at the Kitchener School of Medicine in Khartoum, Dr Tigani el Mahi studied psychiatry in the United Kingdom, obtaining the Diploma of Psychological Medicine of the Royal Colleges of London. He is a member of the WHO Advisory Panel on Mental Health and of the Executive Board of the World Federation for Mental Health.

Review of WHO Publications

First Report on the World Health Situation
(Off Rec Wld Hlth Org No 94)
Geneva viii+392 pages Price 17/6
\$3.25 Sw fr 10— Also available in
French and Spanish

This volume consists of reports on the health situation of 157 countries and territories throughout the world during the period 1954-56 together with a general survey of salient trends and problems.

The individual reports were prepared by governments as a step towards the fulfilment of WHO's constitutional requirement that each Member State shall report to it annually "on the action taken and progress achieved in improving the health of its people". They

will in turn provide a basis for further action directed towards the particular health problems and requirements of the various countries and territories.

The general survey preceding the country reviews contains much information and comment on significant aspects of the world health situation. Its seven chapters deal with influences affecting the health of the peoples, the state of the public health administration of health services and activities, the distribution of functions in the health services institutions and field establishments, education and training and future developments.

The facts and figures cited in this survey

Yemen Iraq Iran and Pakistan is at present being undertaken by the WHO Regional Office for the Eastern Mediterranean. Some of the countries selected for the survey lie on the main pilgrimage routes of the Region and all are particularly exposed to the hazards of smallpox for example between January 1949 and January 1959 13 810 smallpox cases were recorded in the Sudan 6052 in Iraq 5077 in Iran 2577 in Ethiopia and Eritrea and 956 in Saudi Arabia.

The survey is being carried out by Dr Ahmed Amin Sidky of the United Arab Republic (Province of Egypt) formerly Director of the Health Services of Alexandria and Cairo and Mr Paul Ledermann a Swiss laboratory technician. Dr Sidky and Mr Ledermann are visiting institutes producing smallpox vaccine for the purpose of studying its potency and are investigating smallpox incidence among populations periodically exposed to the disease. They are also examining the methods used by the public health authorities to check the disease (case finding and isolation of suspected cases vaccination campaigns etc.) and recommending

the use and production on the spot of dried smallpox vaccines which are more resistant than ordinary vaccines to the high temperatures prevalent in the Region.

Swimming pool sanitation

Supervisors of swimming pools have the responsibility of seeing that bathers are adequately protected against diseases that might be transmitted by the water in the pools. The Philippine Department of Health accordingly held a swimming pool sanitation course from 6 to 26 April 1959 for supervisors of pools in Manila and suburbs. The course which was the first of its kind to be held in the Philippines was under the technical supervision of Mr Gerard Murphy a WHO sanitarian.

The course dealt with sanitary requirements for water used for bathing and with the technical problems involved in the proper maintenance of swimming pools. Practical demonstrations of sanitation techniques and tests were given at pools in various parts of Manila.

People and Places

Hospital statistics in Thailand

The need for making the fullest use of hospital morbidity data is widely recognized. Particularly in countries where knowledge of causes of death is limited by shortage of medical personnel hospital statistics are a valuable source of information on the health needs of the people and the extent to which they are being met.

A WHO assisted project to organize hospital statistics in Thailand to design the records and statistical forms and to establish a central hospital statistics service will be started shortly. Dr Lowell A. Woodbury at present statistical consultant at the College of Medicine of the University of Utah was recently appointed WHO statistician for this project. Dr Woodbury has a Ph.D. degree in statistics from the University of Michigan, Ann Arbor.

Teaching of paediatrics

Dr Gillis Herlitz of Sweden has been appointed WHO Visiting Professor of Paediatrics

at the Grant Medical College Bombay for a period of one year. Dr Herlitz who was appointed Chief of the Paediatric Clinic in Linköping, Sweden in 1944, has already worked in India as Senior Officer in Maternal and Child Health with a WHO assisted project in Madhya Pradesh from 1956 to 1957.

Communicable eye diseases

The WHO/UNICEF assisted project for the control of trachoma and seasonal epidemic conjunctivitis in Tunisia which started in November 1953 is expected to come to an end this year. During May Dr R. d. Haussy paid a second visit to Tunisia as WHO consultant to review the progress of the project. Dr d. Haussy is an ophthalmologist with a long experience of tropical medicine having worked in various African and South East Asian countries. He was at one time Director of the Institute of Tropical Ophthalmology in Bamako, French West Africa where he devoted much time to the study of trachoma and ocular onchocerciasis.

CORRIGENDA

Vol 13 No 3

INTERNATIONAL NON-PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

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p 157 fourth name

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Vol 13 No 5

NEW SPECIES OF MOSQUITO

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and in the country reviews are derived in the main from the period under review but since the broad lines of the picture thus presented can change only very gradually the observations and suggestions made are of topical interest and are likely to retain much of their validity in the foreseeable future.

Among the many interesting developments described in the general survey is the marked change in the role and scope of the modern health administration—a reflection of the increased awareness among the nations of the world of the importance of health not only to the individual but also as a factor in social and economic progress. The health worker of today is no longer content with lowering death rates; there is increased insistence on improving the quality of human life.

In the chapter on future developments there is a discussion of the general move of public health administration in the direction of co-ordinated planning and the organization of a decentralized system; the effect of new techniques in communicable disease control; rural health development and the continuing difficulties in the supply of medical manpower. For the improvement of living and working environments most of the technical facts about safe water supplies, the disposal of sewage and the health aspects of housing are already known so that it should not be difficult to make substantial progress and in the long run the cost of well designed environmental schemes will be covered by the economic benefits derived from reduced death and sickness rates. The same chapter deals with other topics of current interest such as community development, health aspects of radiation and field research and investigation. It concludes

with some comments on international collaboration which is finding fuller expression in many ways and lays down as an essential consideration for any advance in health work "a modest and co-operative approach for every country has both something to learn and something to teach."

The country reviews have been grouped according to the WHO regional pattern which facilitates the comparability and interpretation of the data. In each of them the section devoted to the health situation is preceded by a brief statement of general background information.

For many of the governments the provision of suitably complete and accurate narratives has been no easy task. Some lacking more comprehensive data have been able to supply valuable information from sample surveys; others however have not yet been able to produce basic figures. In the successive reports to be published at intervals it is hoped that the country reviews will gradually become more complete.

In this connexion the volume contains in its introduction and in the general survey some comments on the various fact-finding techniques available to health administrators. Statistics essential as they are require evaluation to be fully effective tools. The pros and cons of special and general surveys are discussed and emphasis is placed on the value of annual reports written by national directors of health.

The narrative for each region is prefaced by a reference map of the countries and territories concerned while the general survey includes maps and figures showing climatic regions and density of population and illustrating the trends of the main quarantinable diseases in recent years.

WHO CHRONICLE

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WORLD HEALTH ORGANIZATION

BULLETIN

DE OF
L'ORGANISATION MONDIALE THE WORLD HEALTH
DE LA SANTÉ ORGANIZATION

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The economics of the disposal of sewage and trade effluents—*C B Townsend*

La réaction cinétique de séro neutralisation des virus poliomyélitiques—*Pierre Lépine Francis Roger & Annie Roger*

Fluorescent antibody staining of rabies virus antigens in the salivary glands of rabid animals—*R A Goldwasser R E Kissling T R Carski & T S Hosty*

Anicteric virus hepatitis in a closed environment as shown by serum transaminase activity—*Fernando de Ritis Livio Malluci Mario Coltori Giuseppe Giusti & Mario Cordero*

Protein malnutrition in South India—*K Somenwaro Rao M C Swaminathan S Swarup & V N Potwardhan*

Naturally acquired tuberculin sensitivity in Netherlands New Guinea—*Gerard Wijsmuller*

The vector of filariasis in Djakarta and its bionomics—*C Y Chow Lie Kian Joe R M P Winoto M Rusad & Soegarto*

Cause of death statements in Ceylon a study in levels of diagnostic reporting—*Richard Padley*

Cancer registration and studies of incidence by surveys—*Percy Stocks*

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TWELFTH WORLD HEALTH ASSEMBLY

The Twelfth World Health Assembly which was held from 12 to 29 May 1959 in Geneva was attended by the delegates of 82 Member and Associate Member States as well as representatives of the United Nations specialized agencies and inter governmental and non governmental organizations in official relations with WHO. Observers from several non Member States were also present.

The session was opened by Dr Leroy E Burney, President of the Eleventh World Health Assembly, who welcomed the delegates and paid tribute to the memory of Professor Andrija Štampar, President of the First World Health Assembly. He went on to refer to some of the important topics with which the Assembly would have to deal, including malaria eradication, environmental sanitation and the role of WHO in international research.

The opening meeting was then addressed by Mr Dag Hammarskjöld, Secretary General of the United Nations, who spoke of what he called "the impressive scope of the tasks now facing the Organization going on to say your practical work both directly by its own results and in support of the work of the United Nations and its agencies is making a major contribution to that improvement in human welfare which is one of the main purposes of the United Nations Charter."

Next, Mr David Morse, Director General of the International Labour Office, stressed the continuing co-operation between WHO and ILO, whose interest and work he said may often coincide but never really conflict.

Our medical interest has classically been preventive and is confined to man's personality as a worker. Yours is universal: our interest in matters of social justice and improvement is universal."

The Assembly unanimously elected Sir John Charles, Chief Medical Officer at the Ministry of Health, Ministry of Education

and Home Office, London, as its President. The three Vice Presidents elected were Dr D El Azmeh (United Arab Republic), Dr V Marinesco (Romania) and Dr O Souvannavong (Laos). Dr H B Turbott (New Zealand) was elected Chairman of the Committee on Programme and Budget, and the Chairman of the Committee on Administration, Finance and Legal Matters was Dr O Vargas Méndez (Costa Rica).

In his inaugural address (see page 296) Sir John Charles spoke of the tasks of the individual worker and of WHO in the field of medical research.

REPORT OF THE DIRECTOR GENERAL

Introducing his report on the work of WHO during 1958¹, Dr M G Candau, Director General of WHO, said that as 1958 had marked the tenth anniversary of the Organization, it was natural that the year's activities should be viewed in the light of the progress made during the preceding decade. He drew the attention of the Assembly to certain aspects of that progress not so much because of their importance in the past but because of the vital influence they would have on the future work of the Organization. First of all came malaria eradication, a task in which the Member States of the Organization had been engaged since 1955. "Malaria has disappeared from regions of the globe whose population totalling 300 millions was previously exposed to the risk of this disease. In still other countries and territories with 700 million to 800 million inhabitants eradication campaigns are being either already implemented or prepared. This means that of 1300 million people who only a few years ago were actual or potential victims of malaria, only 250 millions still remain unprotected by eradication measures."

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

PRINTED IN SWITZERLAND

Peru eradication has made rapid headway in the coastal areas while complete eradication is expected in Venezuela within two years. The delegate of Spain stated that between 1947 and 1958 the number of malaria cases in his country diminished from half a million to only 17. A number of delegates announced that eradication campaigns have recently been launched or are in the preparatory phase in their respective countries.

The delegates of India and Yugoslavia made an urgent plea for further contributions by governments to the Malaria Eradication Special Account and the delegate of the German Federal Republic announced that his Government would continue to support the fund and intended to contribute a further \$350 000 to it during the next two years. The delegate of Poland announced that his Government was prepared to make \$80 000 worth of DDT powder available for the world wide malaria eradication programme.

Polio myelitis

The delegate of Israel referred to an epidemic of poliomyelitis in his country which appeared to have overcome the protection afforded by vaccination. This epidemic had occurred during the months May-August 1958 after all children between 6 months and 3 1/2 years had received two or three injections. In all 574 cases of paralytic poliomyelitis were notified representing a rate of 79 per 100 000. The vast majority of cases being due to type 1 infections. Tests for potency showed that antibody conversion rates (of triple negative children) to type 1 virus were of the order of 20-30% after the first two doses and about 50% after the booster injection. These low rates appeared to be due to two causes: a vaccine of low potency against type 1 and the small doses given (the first injections of the 1957 campaign consisted of 0.3 ml given intradermally subsequently 0.5 ml was given subcutaneously). Since the middle of 1958 an improved vaccine has been used and 1 ml doses are being given subcutaneously at each injection. A close watch is being kept on the situation

particularly during the months when the incidence of poliomyelitis reaches its seasonal peak.

The delegate of Ireland stated that his country's public health authorities were very interested in the possibility of using live virus vaccines and also in that of incorporating polio vaccines with other vaccines in order to reduce the number of inoculations at present given to children. The delegate of Switzerland also expressed interest in the possibility of using live poliovirus vaccines. More than 60% of the population of Switzerland below the age of 20 have been inoculated with inactivated vaccine but serological examination has shown that a high percentage of children vaccinated three times at the intervals prescribed by Salk have not formed antibodies against types 1 and 3. Strictly controlled tests with live vaccine are at present being carried out in Switzerland and so far the results have been most encouraging. The Netherlands delegate stated that small groups of volunteers in the Netherlands have been inoculated with live poliovirus vaccine with apparently satisfactory results. Live vaccines are being tested in several other countries and territories including the Belgian Congo, Colombia and Costa Rica. The United States delegate considered that a number of important problems remain to be solved before live virus vaccines can be used other than experimentally. These include apparent differences in virulence of some of the virus strains used, transmission of virus from vaccinated to unvaccinated persons, difficulties in feeding the three virus strains simultaneously and the effect of viruses other than poliovirus in the intestinal tract on the development of immunity to poliovirus. He also expressed some doubt as to the validity of the epidemiological surveillance of the populations so far inoculated with live virus strains.

The delegate of the USSR where extensive tests of live poliovirus vaccines have been carried out referred to a meeting just then being held in Moscow between scientists from Czechoslovakia, Poland, the United States and the USSR to discuss the early results of vaccination by such vaccines.

Nevertheless there could be no real progress towards the goal of eradication in any one country unless the conditions for success were established on a world basis and it was the task of WHO to assist each country to provide these conditions. At the root of the idea of malaria eradication there was undoubtedly the danger of the development of anopheline resistance to insecticides. Ten species of anophelines had already acquired such resistance and eradication should therefore be pursued rapidly and tenaciously.

The policy of eradication was however applicable not only to malaria but to smallpox as well. If there was one disease in the face of which the world remained indivisible it was smallpox as long as it survived in a single country it constituted a danger for all and called for costly and complicated precautionary measures. It was to be hoped that the organization of international action against smallpox under WHO auspices would finally free the world of a disease which—since the means of its prevention had been known for almost a hundred and fifty years—was an anachronism.

Dr Candau went on to speak of the intensified international programme of medical research which would be discussed by the Assembly. The success of this programme depended to some extent on progress in professional education and training generally. In this connexion the WHO fellowships programme—one of the most successful and promising aspects of the Organization's work—would have an important part to play.

Finally Dr Candau spoke of the problem of environmental sanitation which was one of the principal items on the Assembly's agenda. Although WHO had succeeded in assembling and disseminating the technical knowledge available in this field and had contributed towards the education of environmental sanitation personnel it had not succeeded in arousing public interest in the problem nor had it been able to make judicious use of the pilot projects undertaken in the field. The result was that present WHO programmes frequently failed to provide solutions for the environmental sanitation

problems caused by the continuous growth of population and the parallel development of urbanization and industrialization. In fact it would be no exaggeration to say that in the matter of environmental sanitation the world was in a more difficult situation than it had been ten years ago. To attack this problem WHO would have to take the initiative in establishing a plan of action to provide all the people of the world with an adequate supply of safe water so as to satisfy the elementary needs of hygiene, comfort and cleanliness both of the individual and of the community.

The general discussion on the Director General's report gave delegates an opportunity to express the views of their governments on the Organization's policies and achievements and to report on public health developments in their own countries. Some of the main items of discussion are summarized below.

Malaria eradication

The delegates of a number of countries gave details of progress in the fight against malaria. In Ceylon for example it was decided in 1957 to launch an eradication campaign which it was estimated would last for five years and cost 18 million rupees. The campaign was started in 1958 and it was now found that in view of changing conditions—increasing population, jungle clearance and the influx of people into newly developed areas—an additional 8 million rupees would be required to complete it successfully.

In the Belgian Congo all urban centres and several large rural areas are already free from the malaria vector. The delegate of Greece stated that malaria has now been eliminated from one third of the national territory. In India the eradication programme is making good progress and complete coverage of the country is in sight. It is anticipated that more than 12 million persons now exposed to malaria in Iran will be protected within the next few years. The campaign in Liberia is also making good progress and the delegate of Liberia expressed the hope that his would be the first African country to eradicate the disease. In

7 500 000 doses of smallpox vaccine at the very low average cost of less than one half penny sterling per dose

The delegate of Portugal stated that smallpox had been eradicated in his country since 1954 and that eradication of the disease as a result of mass vaccination would shortly be completed in Portuguese territories overseas. Considerable progress in the treatment of smallpox has been made in Viet Nam since compulsory vaccination was introduced in 1954 there were 3500 cases of the disease in that year but only 30 in 1958. Sufficient dried vaccine has been produced by the Pasteur Institute of Viet Nam not only to serve the country's own needs but to supply neighbouring countries with 250 000 doses. A striking decline in the incidence of smallpox was also reported from the Republic of Korea where only 7 cases were recorded in 1957 as compared with over 43 000 cases in 1951. As a result of the nation wide campaign against smallpox in Iraq not a single case of the disease has so far been reported there this year. In Colombia it is hoped that 80% of the population will be vaccinated against smallpox within the next two years. Wide spread preparations are being made for a mass antismallpox campaign in Ghana and it is hoped that neighbouring countries will help by carrying out active campaigns in their own territories. Smallpox eradication campaigns are also being planned in Ethiopia and Iran.

Bilharziasis

The delegate of the Sudan drew attention to an outstanding achievement in the field of bilharziasis control the complete eradication of snail vectors of bilharziasis in the country's network of canals totalling 8000 km in length. Vigilant maintenance and supervision since eradication was achieved have kept the area—a densely populated one with thick vegetation—free from snails over a period of four years.

Difficulties were reported in the bilharziasis project in Iraq mainly because of staffing problems. It was expected that the control and eradication of the disease would be complicated still further by the new land

reform law which although contributing immeasurably to the improvement of health and living standards in general involves irrigation projects liable to cause an increase in the incidence of bilharziasis. The delegate of South Africa mentioned that such an increase has occurred as the result of irrigation schemes in those areas of South Africa which formerly malarious are now being opened up for agricultural development. In Ghana it is feared that the disease may also spread as development plans are put into operation.

The United Kingdom delegate observed that while much is already known about the parasite that causes bilharziasis as well as about control measures not so much attention is paid to its effect on the community. He illustrated this statement by taking the case of an area in Uganda where some 100 000 people are infected. In the children there is much anaemia and enlargement of the spleen yet after the age of 20 the infection seems to disappear. Moreover the type of infection varies so much from area to area that indiscriminate treatment of all infected people may not be the best means of control but may destroy immunity naturally built up in certain areas.

Leprosy

The delegate of the Philippines expressed the hope that the data on leprosy collected by WHO would be made available to Member States as soon as possible. The Philippines authorities are also collecting and tabulating data on leprosy and estimate that the relapse rate during the first five years after the disease has been arrested is normally 1.5 and that it is 3% for cases in which treatment has not been continued. There have been some cases of relapse more than eight years after the disease has been arrested.

The delegate of Peru reported encouraging results in leprosy control by means of BCG vaccination. This method is also being used in Colombia and Venezuela. In India apart from 150 leprosanatoria with about 25 000 beds and over 1 000 clinics there are 72 leprosy case finding and treatment centres with mobile teams. These have so far surveyed

Tuberculosis

The delegate of Turkey observed that while tuberculosis has ceased to be a major health problem in certain countries the disease still persists in almost every part of the world. He was particularly glad therefore to note that studies had been carried out on a BCG vaccine which would retain its biological properties over a long period under adverse climatic conditions. The delegate of South Africa stated that tuberculosis was the most important public health problem in his country and that the same was true of many other countries which were also undergoing rapid industrialization. Fortunately he added scientific knowledge and effective drugs are available for dealing with the disease provided national programmes are well planned in this respect the technical advice and assistance of WHO are invaluable.

Speaking of the results obtained at the Madras Tuberculosis Chemotherapy Centre the delegate of India said that they demonstrate the possibility of rendering infective cases in crowded urban areas non-infective by treatment with drugs suitable for self-administration at home. A warning about this form of treatment came however from the delegate of Switzerland who said that it is a source of concern to many phthisiologists because of the risks involved if it is not applied with the requisite competence, perseverance and regularity. Another problem mentioned by the same delegate was that of the use to which the hospital beds freed by the decline in tuberculosis are now being put. In this connexion the delegate of Spain stated that of the 22 000 beds formerly reserved for tuberculosis cases in Spain 10 000 are now available for sufferers from cardiovascular disease and for handicapped children. The United Kingdom delegate considered that an important aspect of tuberculosis to which WHO should give more attention is that of rehabilitation.

The delegate of Poland stressed the importance of providing a legislative basis for any programme of tuberculosis control and described the operation of the Tuberculosis Act passed in his country at the beginning of 1959. This Act provides for free services for the

prevention and treatment of tuberculosis, rehabilitation both medical and occupational, compulsory medical examinations for case finding, compulsory treatment and BCG vaccination.

An interesting development in the international co-ordination of tuberculosis control in Latin America was referred to by the Peruvian delegate. In an area of 5 million inhabitants situated partly in Peru and partly in Bolivia the incidence of tuberculosis is as high as 10%. An agreement has therefore been signed by the two countries for the organization—with the technical co-operation of the Andes Mission, UNICEF and WHO—of economic, nutritional and tuberculosis surveys to be carried out among the population of this area. The tuberculosis survey will employ tuberculin testing and mass radiography and will be followed up by a BCG vaccination campaign.

Progress in the treatment of tuberculosis was reported from a number of countries and territories. The delegate of Israel stated that the tuberculosis mortality rate in his country has gone down to less than 5 per 100 000. A tuberculosis demonstration and treatment centre has been established in Addis Ababa by the Government of Ethiopia. In Greece a tuberculosis dispensary has been set up in the Athens area for research, treatment, the training of medical and auxiliary personnel, tuberculin testing, the vaccination of the population of the area and the study of statistical data.

Smallpox

Details on the production of smallpox vaccine in Nigeria were given by the delegate of that country. Since 1932 when production first began, Nigeria has been one of the largest producers of smallpox vaccine in the world, supplying not only national needs but those of some other West African countries as well. In recent years it has produced a stable dried vaccine which does not require refrigeration but retains its potency for several years. Extensive field trials have shown that this vaccine compares favourably with any similar vaccine produced elsewhere in the world. In 1958 Nigeria produced

Progress in this field was also reported by the delegate of Morocco where the WHO/UNICEF assisted campaign against communicable eye diseases has covered a million people in the past year. This campaign includes health education as well as case finding and treatment. The delegate of Greece spoke of the decline in the prevalence and incidence of trachoma and allied eye diseases in his country where there has been a network of antitrachoma dispensaries for a number of years.

A trachoma pilot project among Indonesian schoolchildren was completed in 1958. A campaign against infectious eye diseases is to be undertaken by the Government of Jordan next year and a similar campaign is in the planning stage in Libya.

The delegate of Israel felt that more attention should be paid to the sequelae of trachoma which are of great social importance. He also observed that it had been found in Israel that as the living and hygienic standards of immigrant groups improved trachoma gradually died out without much active treatment.

The filariases

The delegate of France called for intensified research on and control of onchocerciasis in Africa and filarial infections in the Pacific suggesting that WHO send experts to the affected areas to help the health authorities with mass control campaigns. The delegate of Ghana said that onchocerciasis was a disease of serious public health importance in his country where a medical field unit has for some time been seeking solutions to the problems involved in its control. A WHO assisted study of blindness due to onchocerciasis and ways of preventing it has been undertaken in the Sudan. This problem is also a source of grave concern to the Nigerian health authorities. The delegate of Sierra Leone hoped that it would shortly be possible to proceed with the control and eradication of onchocerciasis in his country where some of the earliest and most important research on the disease was carried out. Onchocerciasis has recently

been discovered in Venezuela and the incidence appears to be high in those areas where it has so far been found although ocular lesions seem to be less frequent and less serious than in other countries. The disease has also been reported recently in Aden and the Yemen.

The delegate of Ceylon spoke of the problem of endemic filariasis in the western part of his country. The economic losses due to the disease are serious since two of the country's most important sources of revenue—the coconut plantations and the fishing industry—are centred in the endemic area. In India a nation wide programme of filariasis control has been started.

The delegate of Italy suggested that certain arthropod borne diseases such as filariasis and leishmaniasis should receive more attention from WHO. Supporting this suggestion the delegate of Indonesia stated that filariasis is endemic in various parts of his country where a shortage of trained personnel makes it difficult to give the disease the attention it needs. It was his opinion that WHO could foster and encourage at least the beginning of research on the epidemiology, treatment and prevention of filariasis in Indonesia and elsewhere.

Diarrhoeal diseases

The delegate of Israel said that his Government was anxious for more data and advice on diarrhoeal diseases which are an important problem in all Eastern Mediterranean countries. A pilot project conducted in Israel with 700 children seems to indicate a variety of etiological agents, no correlation has been found with overcrowding though it has with the type of milk used. The delegate of Cuba said that during the first half of the present century his country's most serious mortality problem has been that of deaths from diarrhoea and enteritis among infants under 2 years of age. The principal cause of these diseases in Cuba is intestinal parasites, particularly *Trichuris* with which almost 100% of the inhabitants of certain areas are infested.

5.5 million people and found 53 000 cases of which 46 000 are at present being treated. A considerable amount of the health budget of the Republic of Korea is spent on the care of nearly 20 000 leprosy cases (out of a total of 45 000) in government supported institutes while in Nigeria about half a million leprosy patients are receiving regular treatment. The leprosy control programme in Thailand which started in 1955 in one northern province was last year extended to three more provinces where it is being conducted by means of house to house surveys and domiciliary treatment. The Viet Nam authorities are engaged in a vigorous antileprosy campaign: new dispensaries have been opened for the treatment of the disease and mobile teams each consisting of one health officer and one male nurse are being organized. The delegate of Viet Nam urged increased technical and material assistance by WHO in the fight against leprosy. The Government of Pakistan where leprosy has been a scourge for generations has now decided to undertake a campaign for the eradication of the disease.

Venereal diseases and the treponematoses

Good results in the campaign against venereal diseases were reported by the delegate of Morocco where systematic treatment of certain sections of the population with PAM (procaine penicillin G in oil with 2% aluminium monostearate) has almost completely eradicated syphilis. Since the beginning of the campaign almost one million people have been treated.

Further progress in yaws control was reported by the delegate of Nigeria where 4 million cases have been treated and by the delegates of Colombia, Liberia, Sierra Leone and Thailand. The delegate of Indonesia said that his country's yaws eradication campaign which was the largest in the world had had to slow down in 1958 for reasons beyond the control of his Government so far in the campaign no serious side effect from the penicillin used had been observed in any of the millions of people treated. The delegate of France expressed his appreciation

of WHO's co-operation in research work on yaws in French territories. In a general statement on problems of dermatology Professor W. Jadassohn of the International League of Dermatological Societies spoke of the immense value of WHO's achievements in the control of yaws and endemic syphilis.

The delegate of Italy thought that the successes recorded in the control of the venereal diseases and treponematoses should in no way lead to a slackening of effort in this sphere. In fact the incidence of syphilis has shown an upward trend in a number of countries during the past few years and gonorrhea is being more and more characterized by lessened sensitivity or by greater resistance to penicillin on the part of the gonococci. Moreover while the WHO campaigns against endemic treponematoses have been remarkably successful it was the opinion of the delegate of Italy that an all-out effort should now be made for their total eradication.

Communicable eye diseases

Several delegates expressed their appreciation of the WHO/UNICEF assisted programme against the communicable eye diseases which has already been extended to 11 countries and in the course of which more than 6 million people have been examined and more than 4 million treated. The delegate of Yugoslavia gave an account of the campaign against trachoma undertaken in his country shortly after the Second World War. In 1947 case finding surveys began in all the areas where trachoma was endemic and during the period 1947-1952 more than 2.5 million people were examined. WHO/UNICEF assistance to the campaign began in 1954. In 1949 there were more than 86 000 cases; by 1958 the number had fallen to 21 000. The proportion of progressive cases has declined remarkably. Treatment is given mainly at home and in schools and cases are hospitalized only when surgery is necessary. Excellent results have been obtained by treatment with antibiotics which was started in 1954.

them within a measurable period of time. He added that while WHO could not be expected to make substantial financial contributions in this connection, owing to its limited budget its technical aid would be invaluable. The United States delegate also stressed the importance of potable water supplies and stated that the President of the United States had asked Congress to make funds available for WHO's programme in this field. The delegate of Morocco considered that the problem of sewage disposal as well as that of water supplies should be given special attention.

Education and training

A shortage—in some cases an almost total absence—of health personnel continues to hamper public health programmes in various countries. In Nepal the delegate of that country stated there is only one doctor for every 80 000 inhabitants and there were no qualified nurses until recently. To meet the shortage of doctors advantage is being taken of the fellowships in basic medical training offered by such agencies as WHO and the Colombo Plan and by governments of other countries. During the next five years 150 more medical graduates should be available but even then there will be only one doctor for every 32 000 people. As an interim measure a school for health assistants was started three years ago with help from WHO. Two batches of students have now graduated and are operating 13 health centres. It is expected that a further 24 centres will be established this year. With the help of WHO a school of nursing has also been started but the absence of a hospital with suitable training facilities in midwifery is a great handicap. The WHO Regional Office for South East Asia has therefore awarded fellowships to enable nurses from Nepal to study midwifery in India. The Indian Government is now helping with the establishment in Nepal of a maternity hospital and child welfare centre where midwifery training can be given in the future.

The delegate of Libya also stressed the lack in his country of the necessary trained

personnel for the operation of even routine health services. Moreover for some years to come it will be impossible to find candidates with the basic qualifications required for training even as laboratory technicians in recognized institutions abroad. In the opinion of the delegate the only way to fill the gap would be for WHO to send teachers to the country and give instruction in the local language to candidates showing suitable ability even though their formal educational qualifications might not reach the standard required for training elsewhere.

Several delegates referred to the opening of new schools for health personnel. In Peru for example two new medical schools and three schools of nursing were opened in 1958 and a school for nursing instructors will be opened this year. In Venezuela a public health school has been opened at the Medical Faculty of the Central University at Caracas. In Iraq a second medical school has been opened. It is intended for students from the northern part of the country and its graduates will serve in their own areas thus reducing the concentration of doctors in the towns.

The delegate of Spain considered that the training given in medical schools should be adapted to meet the needs of modern society and above all that it should lay greater stress on the preventive aspects of medicine. Several other delegates spoke of the increased attention being paid to the social and preventive side of medicine in medical schools in their respective countries and welcomed WHO's efforts to promote the concept of prevention in undergraduate medical training.

There was general appreciation of the WHO fellowships programme. The delegate of Poland reviewed the extensive facilities for training and research in his country and stated that his Government would be happy to offer fellowships for work in research institutes and medical schools to candidates from abroad.

Atomic energy and radiation

The delegates of several countries spoke of the need for adequate protection of the public

Maternal and child health

Substantial reductions in infant mortality were reported by a number of delegates although diarrhoeal diseases and protein malnutrition continue to be responsible for high infant death rates in certain countries. The delegate of Austria spoke of the special measures being taken in his country with the help of WHO and UNICEF to reduce the high infant mortality resulting from premature births. In this connexion a plan for the establishment of centres for the care of premature infants in Austria has been established. A further WHO assisted programme has led to an improvement in the production of vaccines and sera for the protection of Austrian children.

The Ministry of Health for Libya is giving priority to maternal and child health training projects and the establishment of maternal and child health sub centres throughout the country. Israel is paying particular attention to the development of maternal and child health and its public health authorities are convinced that the general improvement in the country's health is due in large part to better services in this field. In Poland special emphasis is being laid on preventive work in maternal and child health and a large scale training programme for child health officers including three month courses in social paediatrics has been started. After careful planning the Government of Peru is about to institute a maternal and child health programme with UNICEF assistance. Infant malnutrition remains a serious problem in this country and a solution is being sought by developing the health instruction of mothers.

Mental health

The delegate of the United Kingdom expressed gratification at the fact that WHO had embarked on a long term programme for the study of the epidemiology of mental disorders and that studies have also been made on social psychiatry as well as the mental health problems of aging. He went on to describe the study now under way at Graylingwell Mental Hospital in England

to discover whether the provision of large scale psychiatric treatment on an out patient basis can materially affect the great annual increase of admissions to mental hospitals. This service is centred on a day hospital providing active treatment for twenty to thirty patients with a staff of three psychiatrists, occupational therapists, psychiatric social workers, an almoner and nurses. It is claimed that as a result of its work there has been a reduction of 56% in the number of patients admitted to the local mental hospital in one year.

The importance of mental health work and of support by Member States of WHO of the Mental Health Year sponsored by the World Federation for Mental Health were stressed by a number of delegations.

Environmental sanitation

A number of delegates mentioned the serious health problems arising from inadequate environmental sanitation in their respective countries. In Ceylon for example one out of every seven hospital patients and one out of every five out patients at dispensaries suffer from parasitic or water borne diseases while the absence of any form of water supply in certain parts of the Sudan means that many of the inhabitants are nomads wandering from one source of water to another. The Iranian delegate stated that the main concern in his country and presumably in a number of others is the provision not only of pure drinking water but of adequate water supplies to every community.

In Portugal where 96% of the towns and cities now have supplies of pure drinking water a special effort is being made to extend these supplies to all villages with more than 100 inhabitants. A parallel effort is being made in Portuguese territories overseas.

In India an extensive programme is now in operation for the provision of pure water supplies in both urban and rural areas and the delegate of India suggested that a full and exhaustive survey of water requirements should be made in each country with a view to evolving a systematic plan for supplying

Malaria eradication

The Assembly discussed a report by the Director General on the development of the malaria eradication programme. After an introduction describing the evolution of the policy of malaria eradication the report reviewed the situation in each of the six regions. Brief descriptions were given of current pilot projects the majority of which are in Africa where experimental work on the best means of interrupting transmission is most needed. The next section concerned special research projects supported by WHO and was followed by a section on the present status of insecticide resistance in malaria vectors. Finally there was an attempt to appraise the total cost of world wide malaria eradication which was estimated at \$1 691 000 000.

It emerged from the discussions that there was general agreement on the need for participation by the general public in malaria eradication campaigns for this successful health education and propaganda are vital. Several delegates stressed the need for more fundamental field and laboratory research into the problems of eradication such as surveillance techniques chemoprophylaxis and chemotherapy resistance and the development of suitable alternative insecticides for the elimination of vector species resistant to DDT and dieldrin.

The delegate of Nigeria stressed the urgency of developing the pre-eradication programmes now in operation in Africa particularly since these programmes have shown that although the problem of eradicating the disease in tropical Africa is not yet solved it is very close to solution. Further technical and financial details on national eradication programmes were given by a number of delegates.

The Assembly emphasized the need not only for sound technical planning and direction of operations in eradication programmes but also for a high degree of efficiency in administration and organization supported by adequate legislative action and urged governments to ensure that their malaria services are provided with adequate adminis-

trative machinery "to meet the stringent demands of such a time limited programme".

The Assembly also discussed the status of the Malaria Eradication Special Account which stood at \$8 615 000 as of 11 May 1959.² This sum was expected to cover eradication operations planned to be financed from the Account up to the end of 1959 but no funds were available to cover the operations planned for 1960 not to mention the following years. Approximately \$7 000 000 were needed to cover operations in 1960.

Grave concern at this situation was expressed by a number of delegates. The delegate of Iraq pointed out that the bulk of the funds for the Special Account has to be provided by Member States but that the less highly developed countries find it difficult to contribute since they are in many cases already devoting a very substantial part of their health budgets to malaria eradication campaigns within their own boundaries. Nevertheless most of the limited number of Member States which had contributed to the Malaria Eradication Special Account were among the less developed countries while with a few exceptions—notably the United States which had contributed the bulk of the sum now available—the more economically developed countries had so far failed to respond to the appeal. Several delegates expressed the reservations of their governments concerning the principle of establishing special accounts outside the regular budget.

The Director General of WHO stated that unless contributions were forthcoming the malaria eradication programme might well fail as early as 1960. It should not be forgotten that a world wide campaign was necessary and that if the problem of malaria were not solved everywhere the money spent would in fact be wasted. If the question at stake were merely the method of making funds available the alternative might be for a specific amount for malaria eradication to be included in the annual regular budget of the Organization.

The Assembly urged those Member Governments which have not yet contributed to the

against radiation. The United Kingdom delegate referred to the interim report of a committee set up by his Government to examine the possible dangers from radiological examinations. The report refers particularly to mass radiography and concludes that the benefits may far outweigh the genetic or somatic hazards which there might be to the adult population from the small amount of radiation involved if the surveys are well conducted. The use of mass radiography for the examination of schoolchildren is however considered by the Committee to be undesirable. While radiological examination of pregnant women for tuberculosis may be useful, such examinations should be restricted in number and full size film with stringent limitation of field size should be used.

The delegate of Canada stated that his Government has set up a special laboratory to perform the necessary analyses in connexion with radiation protection and that special measures have been taken in Canada to control the disposal of radioactive wastes.

In reply to a question from the delegate of Finland, Dr P. Dorolle, Deputy Director General of WHO, spoke of the speed with which developments in radiation are superseded and of the problem of providing Member States with the most up-to-date information in this field. He thought that one of the best methods is through training courses at which the participants can be given information that has not yet become widely available in printed form.

Miscellaneous

Other topics mentioned in the discussions on the Director General's report included action against cancer, cardiovascular disease and rheumatism, public health administration, dental health, medical rehabilitation, occupational health, health assistance to rural populations and health education. Several delegates were particularly concerned about the health problems posed by the rapid increase in world population.

* * *

The debates on the Director General's report concluded with reviews by the Regional Directors of work in their respective regions during 1958.

BUDGET FOR 1960

A regular budget of \$16 918 700 for 1960 representing an increase of about 11% over the budget for the present year was approved. It includes a sum of \$500 000 for WHO's programme of international medical research.

PROGRAMME FOR 1960

International Health and Medical Research Year

The United Nations General Assembly on the proposal of the delegation of the Ukrainian SSR has invited the World Health Organization to organize—primarily on a national basis—an International Health and Medical Research Year to be held preferably in 1961. This invitation and an associated proposal by the Government of the United States of America were discussed earlier this year by the WHO Executive Board which asked the Director General to submit a report on the subject to the Assembly.

In the Assembly's debates opinion was divided. On the one hand stress was placed on the impetus which the proposed International Year would give to existing health programmes, the training of health personnel, research and the raising of health standards in the economically less developed countries, the International Geophysical Year being cited as an example of a similar undertaking which had brought about tremendous results at relatively little cost in money and effort. On the other hand it was held that as WHO was about to intensify its efforts in research and disease control, the holding of an International Health and Medical Research Year would serve no useful purpose and might even do harm by dissipating funds that were badly needed for existing projects. It was finally decided to reconsider the matter at the Thirteenth World Health Assembly in 1960.

UNICEF spent \$85 million in material aid for health projects and at the beginning of this year a further \$17 million were allocated for this purpose. Important new activities were envisaged in the long term programmes of both organizations and it was fortunate that these would devolve upon them at a time when they both had more than ten years experience and had reached a stage when co-operation between them was accepted as a matter of course and smoothly carried out to the satisfaction of the governments concerned. UNICEF was very much aware of the broader activities of WHO which provided the foundation for much of the work of UNICEF and welcomed the fact that WHO was extending its activities in the field of medical research.

Many delegates voiced their gratitude for the help given to their countries by UNICEF in the form of supplies for health projects and the Assembly expressed in particular its appreciation of the substantial support given by UNICEF to the world wide malaria eradication programme and its hope that this support will be maintained until the complete eradication of malaria is achieved.

New Members

Colombia and the Republic of Guinea have deposited with the Secretary General of the United Nations formal instruments accepting the WHO Constitution thus becoming Members of the Organization. As a result WHO has now 87 full Members and 3 Associate Members.

Membership of the Executive Board

The following States were elected as Members entitled to designate a person to serve on the Executive Board: Ireland, Luxembourg, Nepal, Peru, Sudan and Venezuela. The Assembly amended the Constitution

of WHO to increase the number of persons designated to serve on the Executive Board from 18 to 24. This amendment which will come into force when accepted by two-thirds of the Member States was proposed in view of the fact that since 1948 when the First World Health Assembly met the membership of the Organization has increased from 53 to 90. During the debate on the amendment a number of delegations urged that the six new seats on the Executive Board should be equitably distributed among the six WHO regions.

Renewal of Director General's contract

The Assembly offered to renew the contract of Dr M. G. Candau, Director General of WHO for a further three years, i.e. until July 1963, to assure further successful development of the Organization. Dr Candau has been asked to communicate his decision on this offer to the President of the Twelfth World Health Assembly on or before 1 November 1959.

Technical discussions

The technical discussions at the Assembly were on the subject "Health education of the public". A summary of these discussions will be found in a separate article.

Place of the Thirteenth World Health Assembly

The Thirteenth World Health Assembly will be held in May 1960 in Geneva.

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The Assembly's discussions on three topics of special interest—international medical research, environmental sanitation and smallpox eradication—are dealt with in separate articles.

Malaria Eradication Special Account to make every effort to do so and invited contributions from foundations, industry, labour organizations, institutions and individuals. The position of the Account will be reviewed by the Executive Board next January should contributions still be insufficient the Board will consider measures to remedy the situation.

WHO publications

Opening a discussion on WHO publications Dr N. I. Grashchenkov, Assistant Director General of WHO, spoke of them as being a real shop window of WHO activity and a pool of the experience of many countries. There was general agreement that these publications are of a high standard and that they serve a useful purpose for as the delegate of Finland observed they are the means through which the Organization becomes generally known. The delegate of Sweden remarked that there was no doubt that WHO publications had contributed to the effectiveness and the reputation of the Organization throughout the world adding that Swedish health authorities and institutions regarded them as being of the highest importance. Such publications as the reports of the Expert Committees on Poliomyelitis, Water Fluoridation and the Organization of Medical Care had been of considerable value to the Swedish health administration.

The delegate of Yugoslavia also spoke of the value of WHO publications as a source of guidance to national health authorities while the delegate of Ecuador stressed their usefulness in keeping the less developed countries up to date on scientific progress. In the opinion of the delegate of Bulgaria brevity and clarity of presentation were the most valuable features of these publications. The delegate of the USSR found the activities of WHO in the matter of publications to be deserving of high praise. He mentioned in particular the scientific and practical interest of the *Bulletin of the World Health Organization*, the *Epidemiological and Vital Statistics Report* and the *Monograph Series* and hoped that a wider range of WHO publications would in future be issued in Russian.

OTHER BUSINESS OF THE ASSEMBLY

Headquarters accommodation

The Assembly was asked to consider the urgent matter of providing suitable and adequate accommodation for the Headquarters of WHO. The space occupied by the Organization at the Palais des Nations, Geneva, is no longer adequate in fact additional office space has had to be rented elsewhere in Geneva. Moreover there is no possibility of extending the Palais des Nations to meet the growing requirements of both WHO Headquarters and the European Office of the United Nations. A report on the subject submitted to the Assembly contained the results of consultations between the Director General and the authorities of Switzerland and of the Republic and Canton of Geneva who have offered to assist the Organization in the construction of a suitable building on a site near the Palais des Nations, Geneva, by advancing loans totalling some Sw. fr. 30 000 000 towards the estimated over all cost of Sw. fr. 40 000 000.

After lengthy discussion the Assembly decided to accept this generous offer and asked the Executive Board to arrange for the choice of an architect and a building plan by international competition.

Co-operation with UNICEF

The Assembly heard a statement by Mr Maurice Pate, Executive Director of the United Nations Children's Fund (UNICEF) which was read by Sir Herbert Broadley, the Fund's representative in the United Kingdom. Mr Pate underlined the close association between UNICEF and WHO, both of which were concerned with better health standards, one helping to see that children were given the best possible start, the other covering the whole span of human life. In UNICEF's programme about 270 projects—three quarters of all those aided by the Fund—were in the health field and therefore planned and operated under the technical guidance of WHO. From its foundation in 1946 to the end of 1958

translat on f om the first to th second decade of its existence from the t nt ti e strivngs of its early ye rs to the robust potentialities of its ad t life For th ch ements of the Organization we need look no further th its now n merous and e tens e annals They include the e b tim proceedings of th E ec t Board a d the Assembly we ghly and full of b stance for the future historian. But for th ge ral reader and fo the delegat who strange to say does not find h s greatest solace in the aust re pages of the budget th re is a wo ld of fascinaton in the ann l statement desu ptive of The Wo k of WHO —the report of the D rector-Gen ral.

The record of 1958 s o less pregnant w th informatio interest and inspiratio and yet in certain respects it is a lttle d fferent It sets out w th all its stomary and romant c detail the achievements of WHO in each of its six regions— arying in m nutia b t not n the fundamental objects e f human betterment It describes the progress towards fulfilment of that great dea of malar a eradication— still in ts phase of volution and development It foreshadows the appli cation of the gra d strateg c concept on f eradication to other a d perhaps more amenable diseases

B t o e all th e b oods the slightly restless air of new amb tions One detects the hadow of M nneapolis and the k owledge that there are o w fields of ende ou ready to be tll d by the Organizatio and amongst th m th se of ironme tal sanitatio and medical research

We are all san taria —some of us more fortunately tuat d th o th rs Perhaps we bask at o r ease in the comple p pel ne civilization of the west m wo ld n t f gret g of co rse the as y t often unmitigated pollutio of th atmosphere which is such a un ecessary co munsnt of a dustrial effort Perhaps o the other hand, we are engaged upon a cont uing and only slowly successful battl w th nature Y t the principles of o r training and practice are th same We k ow that the healthy env r ment c p nsi e tho gh t may be so obtan, and slow to be ach e d s an essent i component of healthy l e.

A d o to this questio of research

There is no m e sal tary occupatio for any sc ent st th a to study the writings of his predecessors in the same field of act y He w ll learn how his intellectual ancestor ppeared at a y rat to h mself to be at the peak of k owledge he w ll learn too how many est gat rs never carried through their tasks t completio a d how knowledge often ad ces by leaps rather than from step to step He w ll remember that the ma tle of the prophet does not s t well o the shoulders of the sci ntist—a d f he is in da ge of forgetting that f ct, let him be rem d ed of the fate of the prophecies of the

English st tician and anthropologist Karl Pearson, who in 1903 said thus

~ Looking around from the calm atmosphere of aethnology I fear there really does exist a lack of leaders of the h ghst intelligence—in science—in the arts—in trade e ven in politics I see a want of intelligence in the merchant, the profesioal man, d the workman. We stand at the commencement of an epoch which w ll be marked by a great dearth of ability

How tremendously the events of the past half cent ry have f lified those views Six hundred years ago the first of English scientists Roger Bacon, tabulated the four grounds of human ignorance They were trust in authorities not properly studied custom which leads us to pref r the old to the new confidence in the opinio s of the inexperienced and, finally hiding of ignorance under a parade of superficial wisdom.

These fo r causes of ignorance still hold the field, and the greatest amo gst them is the unwillingness of the human be ng to say I do not know

Let us consider fo a moment the inner meaning of the word research Looked at hstorically t has the meang of intens e enquiry or repeated effort, e n of purs it The French word *cher* is I believe sometimes appl d to that form of ferve t purs it which we in England call co rtship To most of us research means o ganized re se ch a form of hum n acivity as old as Aristotle whose thirty-e gh books of "Problems for Solution" m r r th inquiring restlessness of the Grecian mind.

H prefaces all his questions with the Greek words *dia ti* or why and he sks such 64 thousand dolla co ndrums as these Why is t that those who ha e spongy teeth are ot l ng l ed Why does sneez g stop hiccough, and not belching Why is it we ha e more sense when we grow older but I am more quickly when we are young Why in listening to speeches do many pref r e amples and stories rather than arguments But Aristotle not only asked questio s h undertook research

The modern research worker usually o ganizes his research along one of two lines of enquiry The first which has been called the Edisonian app oach in oles the trying out of all conce able poss b lines, more or less t random It is a method which tests thousands of samples of soil t find a score of new antibiotics, none of which may be safe eno gh to use on h man be gs

It is a method p odigal of expense sometimes successful, but not always so

I often feel that it is like casting a net into the sea thousands of tmes on the chance of catching one coelacanth. In comparison the orthodox method of apprch s slow a d almost ceremonial.

PRESIDENTIAL ADDRESS BY SIR JOHN CHARLES

In the course of a distinguished career Sir John Charles has served as Honorary Physician to HM King George VI as Bradshaw Lecturer and Harveian Orator at the Royal College of Physicians as Medical Officer of Health for the City and



SIR JOHN CHARLES

President of the Twelfth World Health Assembly

County of Newcastle and as Examiner in Public Health at Edinburgh and other Universities. In 1935 he became a Fellow of the Royal College of Physicians and since 1930 he has been Chief Medical Officer at the Ministry of Health, Ministry of Education and Home Office, London. He was Chairman of the Executive Board of WHO at its twentieth and twenty-first sessions (1957-1958).

No one can attain to the illustrious distinction of President of this Assembly without a conscious recognition both of the honour that has been conferred upon the country whose representative he is and of his own shortcomings—shortcomings which the Assembly with its customary charity and forbearance has so kindly overlooked. My Government is very sensible of this tribute to the endeavours extending now over many decades with which it has striven to foster those ideas of international co-operation in the field of health which are in themselves a contribution to the perpetuation of peace and goodwill among nations.

As each succeeding President takes up the torch from his predecessor he has need to pause for a moment while he reminds the Assembly not only of the efforts of our founding fathers—those splendid enthusiasts and seers of visions—but of the magnificent contributions made by so many still with us and whose achievements it is an honour to acclaim. Amongst them is our retiring President—foremost indeed in our memories and ranking also with the greatest of his predecessors in his understanding of the problems and needs of this organization in his dispatch of business, simplicity of manner, directness of address and above all in his friendliness. Citizens of his great republic have served WHO well—Tom Farran, Leonard Scheele, Fred Soper to mention only a few—but none has done so more memorably than Leroy Burney.

Moreover, he will always remind us of Minneapolis—that wet and windy city with the hospitable heart—and of the Tenth Anniversary Commemorative Assembly—a ceremony of rededication—and of the Eleventh Assembly also with its challenging acceptance of new responsibilities. It is impossible to forget Minneapolis and the great state of Minnesota and the unfailing generosity of their inhabitants. Those who lingered longest in Minneapolis were the members of the Executive Board. There at their twenty-second session and again in Geneva at their twenty-third they have prepared the agenda for this Assembly—a galaxy of projects and studies which will satisfy our administrative and deliberative appetites for the next fortnight. We can thank the Board and its Chairman, Dr Percy Moore, for all they have done for us.

Nor would it be appropriate for this occasion to pass without a salute to the Director General and his staff, now a thousand strong. To his gifts of leadership, tact, persuasiveness and indefatigable and selfless industry to his perspicacious vision, this organization owes its harmonious and promising

DARLING FOUNDATION PRIZE

The Darling Foundation Prize is awarded periodically for outstanding achievement in the pathology etiology treatment prevention or control of malaria. It was created to honour the memory of Dr Samuel Taylor Darling, an eminent malarialogist who was accidentally killed while on mission for the Malaria Commission of the League of Nations.

This year the Darling Foundation Committee decided to make the sixth award of the Darling Medal and Prize to Dr Emilio J. Pampana. The five previous awards were made to Colonel S. P. James (1932), Professor N. H. Swellengrebel (1937), Professor H. E. Shortt and Dr P. C. C. Garnham (1951), Dr G. Coatney and Professor G. Macdonald (1954), and Dr P. F. Russell (1957).

At a plenary meeting of the Twelfth World Health Assembly the award was presented by Sir John Charles, President of the Assembly, who outlined Dr Pampana's career as follows:

Dr Pampana was born in Florence, Italy, in 1895. He took his M.D. with honours at the University of Florence and shortly afterwards obtained his diploma in tropical medicine and hygiene at the London School of Hygiene and Tropical Medicine. From 1920 to 1928 he was Chief Medical Officer of mining companies in Colombia and it was during this period that we see the beginning of Dr Pampana's long career in the field of malaria control. From 1928 to 1931 he was assistant in the Institute of Hygiene at the University of Rome, and a few years later was named lecturer of that University.

Dr Pampana commenced his long association with international health work in 1931 when he became a member of the Health Section of the League of Nations. From 1933 to 1938 he was Secretary of the Malaria Commission of the League. In 1938 he returned to Rome to become Chief of the Department of Epidemiology of the E. M. I. C. Institute of Malariology. From 1943 to 1947 he was Director of the Health Bureau of the League of Red Cross Societies and in 1947 he joined the International Commission of the World Health Organization.

In 1948 he became Chief of the Malaria Section of WHO and in 1957 he was appointed as WHO's

first Director of Malaria Eradication, an appointment which he held until retiring from active service with the Organization at the end of last October.

In September 1958, during the Congress of Tropical Medicine and Malaria held in Portugal, he was awarded the Laetzer Prize for achievements in research on malaria.



Dr Pampana delivering the Assembly address at the Twelfth World Health Assembly.

Dr Pampana is known and respected throughout the world of tropical medicine and malaria as a man of great and deep technical knowledge and wide practical experience and as a wise and friendly counsellor always ready to give freely of his store of knowledge and experience.

Dr Pampana, being honoured today for his personal and original contribution he has made to the epidemiology and control of malaria throughout his long and honourable career.

It is an approach based primarily on the inductive method of Francis Bacon—the process whereby from assembled facts a general law is derived but yet it also owes much to the method of deductive reasoning instituted by Descartes. Its several stages have been described by many workers from Descartes onwards but by none more enthralingly than by the great Cambridge woman botanist Agnes Arber. The first stage according to Dr Arber is the choice of a question to answer or an area of biological or scientific thought to explore. And having found his question the researcher will almost certainly be driven to seek out the necessary facts to work upon—either by observation or by experiment.

Now he must avoid the sensuous pleasure of seeking facts simply for the joy of seeking. Dr Arber makes her warning even more specific. There are certain rhythmic repetitive actions to beware of. The mechanical pleasure she says of cutting microtome sections may lull the mind into serene inaction and comfortable passivity.

And so the worker comes to the third stage of his journey—the formulation of the hypothesis based on an exposition of the data he has collected and a search for the relationship between them. The fourth stage involves the testing of the hypothesis not by repetition of the observations or experiments necessarily but often by an examination of the logic of the processes of thought which have led to the conclusions.

And then finally there is the fifth and final stage of the journey—the task of presentation. That is inevitable for to shirk it means that the research worker is failing both himself and his contemporary workers in the same field by withholding communication of his discovery. Communication once regarded as unimportant is now esteemed essential. The research worker may think himself an unfortunate person. He has mastered his scientific techniques and now he must master the arts of the writer and present his conclusions clearly concisely and coherently so that he who runs may read.

George Trevelyan the historian has said. What is easy to read has been difficult to write. The easy flowing connexion of sentence with sentence has always been won by the sweat of the brow.

So much for the individual worker. His task ends with the catharsis of communication. But for those like ourselves members of this great Assembly whose concern is less with the individual problem and more with the organization of researches and

investigations to a common end and purpose there remains the modern necessity of co-ordination.

Even on a national basis co-ordination of research is not easy for one must allow the questing inquisitive human intellect to range where it will. But co-ordination not so much for the prevention of overlapping or redundancy but rather for ensuring that workers in the same field are aware of the activities of other researchers with similar interests—that has become of paramount importance.

There are therefore two main points of entry for WHO into the fields of medical research apart of course from the access it has already obtained by virtue of its own unique contribution to research, particularly in tuberculosis and the virus diseases.

Without entering into or commenting upon that clamant catalogue of research projects outlined in the report of the Director General the two portals of entry I refer to are those inscribed “co-ordination and communication”.

By means of the first we shall hope to save scientists and their supporters much unnecessary endeavour. By means of the second WHO will seek to ensure that happy synthesis of ideas and harmony of minds which difficulties of distance language and attitudes of mind all tend to prevent. I would end on this final note. The student of the natural history of research encounters time and time again that strange phenomenon of instantaneous enlightenment—that moment of vision understanding and comprehension which illumines once and for all the mind of the scientist as he grapples with a problem. It found Archimedes in his bath tub. It seized upon René Descartes one day in the Low Country when stripping all things else from his mind he reached the conclusion. I think therefore I am. It came upon Blaise Pascal in the agony of toothache and showed him the mathematical solution to the problem of La Roulette. It presented itself to Newton in the fall of the apple. It revealed to the great German scientist Kekulé seated one summer evening on the open top of a London bus—the image of the chemical constitution of the aromatic compounds. In the act of placing his foot on the step of a French country omnibus there came to Henri Poincaré the great French mathematician the definition of his Fuchsian functions.

May such a moment of illumination come to us members of the Twelfth World Health Assembly as we contemplate the enlarged role of our organization in this richly promising field of medical research.

THE ROLE OF WHO IN MEDICAL RESEARCH

The great achievements of modern medicine have been based on research in the past research has to a large extent been a haphazard individual pursuit but for the successful results in fields but for a variety of reasons leaving other equally promising fields untouched. Today it is becoming generally recognized that research requires a larger organization than is at present available nationally. The special part WHO can play is the co-ordination of research throughout the world as discussed at the Twelfth World Health Assembly and is evident from the report below.

Modern medicine is founded on a tradition of research. But science and technology are advancing so fast in the twentieth century that human society can no longer depend for its scientific progress on incidental discoveries by gifted individual investigators supported only if at all by the meagre budgets of hospitals or universities. Now that the crucial significance of research in the modern technological world is being realized more public funds are being made available. Research has become the main occupation of numbers of people and talent is being actively sought and developed. This has required much organized effort and as the volume of public funds for research has increased research institutes with full time staff and in due course central national research organizations have come into existence.

Central research organizations now exist in approximately thirty countries throughout the world and although at different stages of development they have some essential features in common. One of their main tasks wherever they are is to guide and assist national research without restricting the freedom of the individual investigator upon whom success in research depends and this they do not by supplanting but by supplementing the functions of universities and research institutes. Ample evidence of their usefulness is furnished by their record and by the steady increase in their numbers.

As national research has gained in momentum an important new fact has emerged

Great though any national research effort may be there remain research problems which cannot be solved within the national boundaries of any one country. And yet the keys to some of the greatest health problems of mankind may very well depend upon their solution. Some problems require exploration in particular geographical regions or climatic conditions or among people of different races living perhaps in special circumstances. Co-ordinated research in different parts of the world, international team work and a more efficient exchange of information are required to fill essential gaps in our knowledge.

In its early days WHO's attention was directed principally towards assisting governments in the control of selected—mainly communicable—mass diseases although it had in addition certain central functions of public health importance mostly inherited from its predecessors. However the problem of research inevitably emerged early in relation to control of these diseases. Scientific knowledge was not great enough to assure the success of control programmes invariably there were deficiencies in methods or in tools and in order to remedy them the experimental approach had to be adopted both in the field and in the laboratory. WHO thus had to undertake what might be called operational research of direct application to its disease control programmes. Very soon however it found itself obliged to initiate and support research which may be regarded as fundamental though here it must be stressed that the distinction between

In his speech of acknowledgement Dr Pampana expressed his thanks for the honour bestowed upon him and said how greatly he prized the award

The Darling Medal and Prize are perhaps the highest award for malaria work and you Sir from whose hands I receive it are the President of the highest forum of international health As I have devoted my life both to malaria and to international health it is easy to imagine what this day means for me

Dr Pampana then gave a brief historical summary of the circumstances which had led up to the launching of a world wide malaria eradication campaign

Many delegates to this Assembly will recollect the situation of malaria control before the Second World War It was based mainly on antilarval measures Malaria eradication was of course unthinkable but even nation wide control was economically unfeasible It was fortunate however that in those years general paralysis of the insane was being treated by malaria because among the new teachings that this technique gave us was that of the limited duration of most malaria infections and this knowledge was the very base upon which the concept of malaria eradication could be built when the discovery of residual insecticides gave us a

nearly universally applicable method to prevent the occurrence of infection The great effort of the League of Nations to stimulate malaria control in the rural areas of the tropics materialized perhaps at the Inter Governmental Conference on Rural Hygiene held in Bandung Java in 1937 At that time among the countries of South East Asia and of the Western Pacific there was none having extensive programmes of rural malaria control except in industrial or agricultural undertakings and this Conference was unable to foresee significant progress The best it could do was to recommend extension of the free distribution of cinchona products the co operation of the people in minor control methods and the exploration of cheaper methods of control which require time more than money Today only four years since WHO adopted the policy of malaria eradication nearly all those countries are carrying out or planning to carry out malaria eradication programmes

"To realize the enormous development that this policy has attained today all over the world is indeed astonishing But it is clear that an intensification of government efforts greater international assistance and a further extension of research are essential

Dr Pampana concluded by reaffirming his faith in the eradication policy which was adopted by the Eighth World Health Assembly in 1955 and again expressed his deep appreciation of the honour done to him

Sanitary science and health

A study of the falling death and sickness rates during the past century illustrates either that there is a direct relationship to the awakening which took place in this period in sanitary science or that both trends have been the result of some common factor such as marked social betterment The evidence strongly suggests that there are many direct relationships for example in the city of Philadelphia before 1906 the rates for typhoid fever reached heights of between 600 and 700 cases of sickness per 100 000 population In 1906 filtration was installed in the city water supply and four years later the typhoid case rate had dropped to less than 100 per 100 000 population The practice of chlorination was begun in 1917 and since that time the annual sickness rate has invariably been below 50 Today it has virtually reached vanishing point

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age medical research through the world to seek either directly or indirectly to remedy these deficiencies. This would inevitably involve consideration of training programmes for research workers and the provision of adequate facilities by countries for workers so trained.

But if WHO is to assist effectively in the development of medical research in a world wide context it can only do so on the basis of a well thought out and reasoned policy and suitable machinery for necessary executive action.

Some guiding principles

In the last analysis the report states "research is the expression of activity in an individual mind and it is not until ideas have developed to a certain stage that their co-ordination becomes possible. Therefore whilst WHO should maintain a keen interest and encourage the organization and early development of knowledge in national centres for medical research the main role of the Organization would come after the stage at which ideas originate.

It has always been a basic principle of WHO's work to operate through existing national organizations. This principle applies with particular force to research. It would be mistaken for WHO to duplicate the work of existing national centres for medical research by creating international centres for such work. Its role should rather be to encourage the highest possible development of national centres and to use these as the bases on which to construct a world wide co-operative effort in those fields where progress depends upon such co-operation.

It would however be unrealistic not to recognize that in the world at this present time the distribution of medical research varies widely. In some countries it is highly developed in both quality and quantity. In others it hardly exists and in many more its development even by existing standards is incomplete. It is evident that if the full potentialities for research in the world are to be exploited it will be necessary to encourage and stimulate all countries to overcome

any shortcomings in their efforts. The World Health Organization is by reason of its unique status and potentialities favourably situated to do this. National governments might accept its advice on the most profitable deployment of their research resources and the need to remedy inadequacies in their research organization when they would be reluctant to accept it from any other body. To this extent therefore the World Health Organization has an important although indirect role to play in the promotion of individual—as distinct from international—research programmes.

The means by which WHO could achieve this end would necessarily vary according to the state of development of medical research in the particular country. In many cases advice would be sufficient. In others some form either direct or indirect of supplementary support would be required. In yet others it might be necessary to initiate the necessary developments by providing appropriate teams of experts. In general however support might not be necessary on a massive scale. Experience has shown that even modest supplementation of existing resources often produces returns out of all proportion to the sums invested if these be judiciously placed.

The extent to which WHO should concern itself with basic research is an important matter of principle. Practical experience has shown that however *utopian* the aim of a research programme progress was frequently arrested by lack of basic knowledge. It has therefore to be recognized from the outset that any extended programme of research will inevitably involve the Organization more and more in basic problems and that it cannot remain indifferent to their solution. From the very nature of the case the need for such basic knowledge cannot be accurately forecast. It can only be revealed as the research unfolds. WHO must therefore be prepared to take a liberal view in judging the relevance of any proposals for research and not allow its activities to be restricted by any set of rigid rules which limit either the fields of research which it can aid or the approach to be adopted or the

fundamental and applied research is an artificial one each merging into the other. Limited as its research activities have been, WHO has nevertheless developed effective co-ordination and assistance methods which have met with the approval of governments and scientists throughout the world. In recent years more and more scientists have sought WHO's support for their work even when it has not been directly connected with WHO programmes.

The Eleventh World Health Assembly requested the Director General to study the role of WHO in research and ways in which it might assist more adequately in stimulating and co-ordinating research and developing research personnel. Accordingly two groups of world authorities in the medical sciences were convened in Geneva in August and in October 1958 to study the role of WHO in medical research. Their views were reproduced in a report to the Assembly. The first group reached the conclusion that

WHO has an important part to play in and a great responsibility for the development and dissemination of scientific knowledge on a world basis. In this it supplements national organizations and philanthropic institutions.

The research programme of WHO should be primarily concerned with

- (i) the solution of those problems which are better resolved by world co-operative endeavour than by local groups
- (ii) the solution of major problems when local effort is inadequate whether by limitations of the research potential of the area or by the nature of the problem.

WHO's objectives should therefore be to stimulate and initiate new research and to promote, organize and co-ordinate existing research by

A supporting the expansion of work in special world health problems (as exemplified by current and contemplated WHO programmes on special diseases wherever the problems may exist and wherever the opportunities may be found to solve them)

B advancing the development of medical research generally particularly through the support of individuals and through the advanced training of research workers and primarily in areas where medical research is in the early phases of development.

These objectives may be implemented in the following ways

A training of research personnel including supervisory technicians

B exchange of established scientists improving contacts among research workers assisting countries in developing their research organizations

C assisting in the planning of research programmes and research institutions and in developing methods of research particularly applicable to world health problems

D giving aid in medical research or emergency research assistance by means of subsidizing research in the form of personnel equipment or grants

The second group whilst recognizing the fruitfulness and high development of medical research in many countries was convinced that there were many important problems which could only be approached on the basis of international collaboration many which could be solved more expeditiously by combined effort and that there were a variety of services centring upon the standardization of materials techniques definitions and terminology which were essential to scientific progress but which could only be secured through action on an international scale.

This group accepted the position that in research as in other fields WHO would seek to act through existing national organizations. But there were many countries where national research organizations either did not exist or were inadequate and others where they were not developed either in part or in whole up to their fullest possibilities. If the potentialities in the world for medical research were to be increased to meet the need WHO could not remain indifferent to these shortcomings and it would be a necessary supplement to any endeavour by WHO to promote and encourage

of cases of any one can be accumulated to provide effective study

A rare kind of pulmonary hypertension has been reported in populations living above 4000 metres. Its study might throw light on the mechanism of pulmonary hypertension in general

"5 As well as rarity of opportunity there is also rarity of skill and there are many examples where knowledge has remained indecisive for unnecessarily long periods because those who could have solved the problem expeditiously had they combined their efforts have continued to work in isolation

"The most evident example of this type of problem lies in the evaluation of special techniques or therapy. Often there are only one or two centres in the most advanced countries where such a technique is available but in each the opportunities for its use are limited or the technique is so exacting that it cannot be widely employed. If however those competent in its use could combine their experience it is probable that a definitive assessment could be obtained in a very few years when otherwise it might be delayed indefinitely. It is not only in technique that such co-operation should be promoted: there are equal opportunities in the field of rare intellectual skills

6 Lastly there is the need for international co-operation that arises not from the scientific nature of the problem but from the absence of the necessary research resources in the countries where the problem is found. Many of the opportunities for and conditions requiring investigation which were considered occurred in such countries. In these circumstances assistance from other nations either in manpower or facilities or both is necessary. This could be arranged through the agency of an international organization like WHO

In broad outline these categories summarize the field to which WHO as an international organization for medical research might direct its attention. Most of them take their start from an identified practical problem but this should not obscure the fact

that each will lead to problems in basic research which must be solved before the research can come to fruition in practice. Just as the malaria control programme has already led to basic work a study of pulmonary hypertension at high altitudes for instance will lead to basic studies on the control of blood pressure in the pulmonary circulation. The promotion of epidemiological studies on a world wide scale will raise basic problems in methodology. The need to adopt a liberal but judicious policy in supporting basic research is therefore as already mentioned quite apparent."

Feasibility of research

"The recognition of the existence of a problem does not necessarily imply that research can usefully be undertaken upon it. Effective research is possible only on the basis of an objective and scientific assessment of the feasibility of research in any particular problem. For the purpose of providing WHO with such an assessment the advisory mechanism has to be devised accordingly

"In making such an assessment the first task is the analysis of the practical need into its component problems and the definition of these as precisely and scientifically as possible. Consideration should then be given to the relative suitability of different existing opportunities for carrying out the work and the availability of trained men, material and equipment. The need to provide any supporting services or to relate the research to any existing institution should be taken into account. Only on the basis of such an objective analysis of the situation is it possible to form a judgement as to whether WHO would be justified in giving any particular proposal its support."

Servicing research

Not only is there a need to standardize nomenclature so that research workers throughout the world may be confident that when the same term is used the same meaning is conveyed but there is also a need to standardize definitions of disease techniques and materials

extension of the programme that is permissible. One of the important functions of the scientific advisory body which has to support any international research effort would be to advise on the extent to which it was justifiable to become involved in basic research in relation to any particular research programme.

The duration of research support is another important consideration. If WHO is to extend its research activities into fields where knowledge is relatively little developed it will inevitably become more involved in long term work. For example years must elapse before the genetic effects on man of low levels of exposure to ionizing radiations are elucidated and the same is true of many problems of virus research, cardiovascular disease and cancer. For this reason it will be necessary for WHO to ensure either directly or indirectly that support for such research is on a stable long term basis but apparatus and material facilities should only be supplied to places where there are men who can use them.

Types of research requiring international organization

It is evident that if collaborative work of any kind is to be undertaken on a world wide scale it is essential to ensure that the workers in different countries shall agree such conventions as will enable them to communicate their knowledge to each other. It is therefore a primary task for WHO in whatever field of medical research it chooses to operate to promote the standardization necessary to allow reliable communication of knowledge and experience.

Certain types of research problems emerge for whose solution international collaboration is either essential or highly desirable. The following broad categories can be distinguished.

1 For certain problems world experience is the unit of knowledge. In this category are included demography, the genetic description of populations, the measuring of the incidence and prevalence of disease and the characterization of the range of environmental

factors both natural and artificial. For many such problems methodology is rudimentary or non-existent.

A sub division of these categories includes those problems which although not world wide can only be fully comprehended on a broad regional basis. Examples of these are conditions such as kwashiorkor and problems common to all tropical countries.

2 Communicable illnesses which are distributed either on a world wide basis or common to large regions of the world require a collaborative approach. In the former group fall many virus diseases and conditions like tuberculosis in the latter diseases like malaria.

3 Contrasting experience is one of the most fruitful stimuli to new thought. Unexplained variations in the incidence and prevalence of disease, the comparison of health and illness in contrasting environments and in different economic conditions have often provided the key to basic knowledge.

In such fields as cancer, coronary thrombosis, hypertension, rheumatoid arthritis and diabetes mellitus the existence of such contrasts is known and urgently requires exploration before, owing to the rapid evolution of cultures in different parts of the world, the contrasts at present evident disappear and the opportunity is lost.

An important sub division of this category is that which leads to the study of a condition prevalent in one part of the world which is relevant to a different condition prevalent in another. A study of certain cardiomyopathies prevalent in Africa might provide a unique means of studying problems of heart muscle metabolism of importance elsewhere.

4 In the advancement of knowledge the importance of an investigation cannot be measured by the commonness of the condition to which it is directed. Often investigation of a rare condition has illumined a whole field of thought and had practical effects far beyond its immediate application.

Many genetically determined conditions are of this nature but it is only by bringing together world experience that a sufficiency

the rank of professor or assistant professor to work for a period of six months or so in a department in another country not only collaborating in research but perhaps also participating in teaching. Second there are the visits by younger men for longer periods the object being to bring together for research two or more workers who have a highly specialized interest in common. Lastly there are the visits of teams of experts to establish some special line of research with a view to its being taken over by the country visited and put on a permanent basis.

An international research organization might assist in the publication and perhaps translation of scientific data urgently needed but either not widely available or not assembled in a comprehensive form or in the production of needed monographs appealing only to a limited audience. One of the problems facing science is to purvey information in a manageable and assimilable form to devise expeditious methods of reference to existing knowledge and to overcome difficulties of language. This problem would have to be tackled by WHO.

The advisory function of WHO

Just as most national central research organizations act in an advisory capacity to their governments WHO it may reasonably be assumed might in due course also develop advisory functions if it could offer a comparable structure at the international level.

Expansion by WHO in the field of international research will require in addition to the existing advisory mechanism a scientific advisory committee to keep medical research and research strategy as a whole under constant scrutiny. This committee would receive information on the research problems, developments and resources of different countries. On the basis of this information and of suggestions or reports received it would recommend to the Director General fields of research that might profitably be explored, advising not only on the desirability of investigating a particular

problem but also on its scientific feasibility in terms of available resources of trained manpower and material and on priorities in research as a whole. It would assess the progress of research sponsored by WHO and—most important perhaps of all—it would try to detect gaps in the research effort. Lastly it would from time to time produce a report putting the programme into perspective against the background of need, opportunity and developing knowledge and attempting to indicate the direction in which further development might fruitfully take place.

This advisory committee would have to contain a representative variety of medical skills and experience so that as a whole it would review each problem comprehensively. In the selection of its members personal ability, merit and qualifications would therefore be the overriding considerations. Such a body might be composed of a chairman and fifteen to twenty members and serve for say four years with membership staggered so as to provide for the retirement of five members each year.

If a proposal for research in a field where knowledge was reasonably well developed came to the advisory committee it would usually be possible for it to advise immediately on whether the proposal was worth supporting and on what kind of arrangement would be required to ensure that it was carried out and integrated with existing research programmes. But if a proposal were received for research in an as yet ill-developed field or the suggestion were made that such a field should be examined this procedure would not suffice. In such circumstances it is likely that the advisory committee once it had decided that a subject required examination would advise the Director General to convene an *ad hoc* group of scientists to assess current knowledge in that field, define as precisely as possible the problems to be solved, identify those open to investigation and recommend where research should be undertaken. On the basis of the group's report the advisory committee would advise if action was desirable and if so how it should be undertaken.

Standard materials are necessary in many fields standard antisera for instance for the uniform identification of bacteria and virus strains standardized strains of animals for genetic work or standardized tissue culture media and standard cell strains grown in tissue culture. The supply of these must be ensured if research is not to be hampered. It is suggested not that WHO should directly supply them but that it should endeavour to arrange for them to be supplied.

Allied to the need for standard materials is the need for reference laboratories in special subjects. Some of these have already been considerably developed by WHO in the field of microbiology but the system is capable of wide development and at present is much needed in virology where it is impossible for workers in the field to identify in detail the numerous virus strains they encounter.

A further service that is required is the dissemination of knowledge. To a considerable extent WHO provides this already but if it is to become more deeply involved in research it will need to expand this service.

Lastly WHO might pay attention to instrument design.

Training of research workers

If medical research is to be furthered more men must be trained to become medical research workers. But training by itself is not enough. There must also be increasing provision for the subsequent careers of men so trained: an adequate number of posts for them to occupy and adequate facilities for them to work with. Great importance is attached to this consideration. If it is neglected the training programme will fall short of achievement and frustration and waste will result.

The problem of training is primarily one for the country concerned. The role of an international agency is confined to assisting individual countries when necessary. Despite the fact that countries [which have no universities and poor secondary education] cannot in the nature of things yet be a source

of medical research workers it was felt that steps could be taken to initiate developments. Often the first step has come from placing a research team in the country. Such teams necessarily recruit local people and often these can be trained as technicians. Gradually the need for education becomes apparent and the value of research appreciated. In this way the setting up of a research team or small institute in a backward country may be an effective way of initiating not only research but also medical education.

Communication in the research field

The communication of knowledge and experience between scientists either by the printed word or by personal contact is an essential feature of the process of research. WHO would not concern itself with promoting large international conferences whose value in research is dubious but with organizing small meetings whose purpose would be not only to elucidate problems on which immediate action was required but also to provide WHO with a continuous flow of assessments of the situation in fields of research which might sooner or later lead to action. It would be worth while sending one or two recognized world authorities to regional or inter regional meetings but they should not be obtrusive: the essence of these meetings is the interchange of views between local people. This type of group meeting is particularly valuable to countries where research workers are few and conditions special.

Senior research experts of wide experience would be needed to tour regions visit laboratories and universities meet personally and informally the people actually engaged in research and form firsthand opinions on local problems and needs. Through such visits contact would be maintained with the worker in the field local morale would be strengthened and local talent perhaps brought to light.

Other types of visit have as their object the carrying out of a specific piece of work. First there are the visits by senior men of

ENVIRONMENTAL SANITATION

The First World Health Assembly gave high priority to environmental sanitation as one of the principal health problems of the world along with malaria, tuberculosis, and venereal diseases. It has thus been one of WHO's main concerns since its inception. Ten years after the WHO's establishment the Eleventh World Health Assembly requested the Director-General to report on progress in the field of environmental sanitation. This report refers to the position of public health personnel and the adequacy of disposal of human waste and to sanitary engineering. The Twelfth World Health Assembly took note of such suggestions and proposals for the action in this field as might emerge from the technical committee in any of its future sessions. The article below summarizes the Director-General's report and proposals.

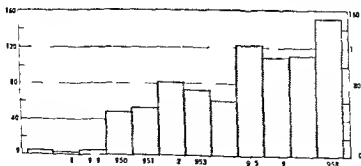
The WHO staff engaged on environmental sanitation increased from 13 (expressed in man-years) in 1948 to 100.8 in 1958. Of the latter, 25.9 were engaged on sanitation field projects. The greater proportion of this staff is used on combined projects since WHO emphasizes the team approach to public health problems. Out of a total of 34 environmental sanitation projects launched by WHO, 19 have consisted of demonstration areas, 8 have sought to develop sanitation activities in national health agencies, and 7 have been teaching and training projects. As in so many other fields of public health, there is a severe shortage of qualified personnel in most countries. Re-

cognizing this, WHO in the period 1947-1958 awarded 807 fellowships to environmental sanitation staff for observation and study abroad (see figure). Its teaching and training projects have included courses for sanitary assistants, schools for auxiliary health personnel, and degree courses for sanitary engineers.

WHO has also sought to disseminate knowledge of environmental sanitation by publishing many technical articles and reports¹ and by convening expert committees. In 1958 there were 14 expert committee meetings on subjects related to environmental

¹ See World Health Organization (1958) Publications of the World Health Organization, 1947-1957, bibliography, Geneva.

NUMBER OF FELLOWSHIPS IN ENVIRONMENTAL SANITATION, 1947-1958



The plan for research

The report to the Assembly on WHO's role in research contained also a research plan largely based on the recommendations of a score or so of scientific groups¹ on a wide variety of subjects from anaemias and antibiotics to vaccines and virus diseases.

This programme of intensified research was discussed at length in the Assembly Committee on Programme and Budget. The Director General of WHO introducing the report suggested that to ensure continuity the office of chairman of the advisory committee should be of a more permanent nature than that of chairman of an expert committee. WHO's approach to the whole question of research he felt should be flexible and gradual as befitted an incursion into a new field of enormous extent.

Various delegations feared that the new programme if adopted would mean the

diversion of resources from such priority projects as malaria eradication, some thought that the programme outlined was as yet too large and not yet defined adequately enough to warrant the addition of a large sum to the regular budget and the composition chairmanship and functions of the proposed advisory committee also met with some criticism. But the general principles governing WHO's role in research as outlined in the first part of the report were accepted as a sound guide to the extension of its activities in that field. The Assembly decided that the plan presented for research constituted a logical continuation and extension of established WHO activities. More extensive international co-operation among the research workers of the world was required to prevent control and cure disease. There was a world wide shortage of qualified scientists and the general research potential of the world needed to be increased. WHO had an important role in increasing this potential and in fostering international collaboration among scientists of the world by stimulating co-ordinating, promoting and supporting research. The Assembly therefore approved the plan in principle. It decided that an Advisory Committee on Medical Research should be established requested the Director General to report on the research priorities and plans proposed, added \$500,000 to the 1960 budget for the purposes of the medical research programme and set up a special account for medical research—into which voluntary contributions could be paid—to supplement the provision under the regular budget.

The following meetings were held: the 1st of the First Meeting in G. 1 M d IR ch Pl g (A. gu t 1958). S. 1 inc G o p on Res ch J D fi en y A a m (October 1958). Seco d Meet g N G al M d cal Rese ch Pl g (Oct ber 1958). Sc. 1 th G p V ru R se reh (No ember 1958). I s f mal Meeting o A th p d B V ru es (No ember 1958). I s f m l Con k t n w th Spec at s Comp r t u Med e (December 1958). St dy G o p n Imm l g l d H m tol g l S y (D ember 1958). Sci tific Gr p o R rh n l ect d R t ce d v t Contr l (J ry 1959). Co l t O o p o Can r f J F b 1959). S. 1 th G o p on R e ch Res h f J F b 1959). S. 1 th G o p on R e ch B th r s (M l l sciences) (F br u ry 1959). S. 1 th G o p o Lep o y Re reh (F br u ry 1959). S. 1 th G o p o Tr hom Res h (M a h 1959). S. 1 th G o p on R se reh n v l m o (M ch 1959). S. 1 th G o p o R h p v D sem t r s f Ar th opod B m e V ru ar h o B d (M ch 1959). S. 1 th Research in C d o ascu l D (M ch 1959). S. 1 th Gr p o C cer R se reh (M ch 1959). S. 1 th G o p o R ear h n H ma G t (Ap l 1959). S. 1 th G o p on Res h n th T eam nt of R d t J j ry (Ap l 1959). Sc. 1 th Gr p n Res h A b l t c s (May 1959).

The economics of sewage disposal

In England and Wales the average cost of drainage services to the individual is 11 5s per year or no more than that of one cigarette or newspaper a week.¹ This small sum pays for the treatment and purification of no less than 50 tons of polluted liquid and half a ton of highly putrescent sludge. Yet it is on these services costing less than one six hundredth part of the national income that the health, prosperity and cultural level of the large urban communities—and indirectly of the rural communities—depend. In short the ultimate benefit is out of all proportion to the expenditure.

these criteria are community water supplies and community sewerage and the former the more dramatic in its appeal is put forward as the spearhead programme WHO should pursue for the next ten years. In some countries in which the geology and topography do not favour satisfactory drainage provision for surface drainage and excreta removal will have to be made simultaneously. But it will often be found that sewerage systems and other environmental sanitation services will as they have done in the past follow the provision of water supplies. Where water supplies and sewerage systems exist and are firmly established other objectives must take their place: for example stream pollution abatement, sewage treatment, food control or air pollution control. Even in advanced countries, however, large sectors of the population lack an abundant water supply of safe quality, not only in rural areas but also in urban areas often of large size.

It is often stated that local financial resources are not available for the provision of community facilities like water supplies. This is frequently not so. It will be necessary to encourage the use of these resources where they exist and in doing so to stress that what chiefly counts in a major capital investment is not the amount of capital sunk but the annual interest and amortization charges which are often small and easily met.

A public water supply is more than a social benefit: it is also an economic and industrial asset. The greater part of its cost should therefore be considered as an investment in the development and productivity of the community. The funds required can be obtained by a variety of methods and successful examples adapted to local conditions are to be found in the Americas in a number of western European countries and in some parts of the Eastern Mediterranean and Western Pacific Regions. WHO could disseminate knowledge of these methods which might well provide valuable precedents. Indeed, it has already made a start: an expert is preparing a manual on the organization and financing of community water supplies.

It should be remembered that the cost of water delivered by pipe to a consumer in his own home is often much less than that of water obtained otherwise and piped supplies involve none of the hard work of going to fetch water that so often falls to the lot of the housewife. Take the case of a typical consumer living in a suburban area near New York. He pays \$18 per year water rate for his family which works out at 1.23 cents per person per day. The average consumption per person is about 400 litres per day. Thus a barrel of water of 200 litres delivered under pressure into his house and of a very high quality costs this householder 0.6 cents. Contrast this situation with that of a householder on the outskirts of Bandung whose wife draws water from a public outlet. In return for a small coin inserted in a meter she gets 40 litres of water. Her coin is worth 0.6 cents so she pays at the rate of 3 cents per barrel or five times what it costs the New Yorker and she must in addition carry the water home herself. In some parts of Bolivia where water is transported considerable distances by ox-cart to be sold in the villages and in some of the squatter settlements of Johannesburg water costs nearly 30 cents per barrel. In these places people do not buy water by the barrel but by the jugful.

Sanitary engineering personnel would have to reorientate their thinking for the large scale programme proposed: learning to tread in fields hitherto assumed to be outside their province, laying less emphasis on rural concepts, concentrating on the development of structural organization and machinery and being prepared to spend much time on financial matters.

In an assessment of the scale of a water supply programme in the Americas it was estimated that 80 000 000 people in that region live in community aggregates which need domestic water supplies and that the cost would be some \$4 000 000 000. If the situation in this region is typical the cost throughout the world would amount to some \$25 000 000 000. External financing would probably be needed only for about half of this, the proportion varying from a

sanitation dealing with such diverse topics as air pollution water fluoridation insecticides and milk hygiene. Much use is made of consultants who visit countries as experts and help introduce new ideas and endeavour to broaden the outlook of governments on sanitary matters and of study groups seminars and other meetings which bring together people for the discussion of problems of mutual interest. WHO collaborates in this field with other intergovernmental international non governmental and national agencies not only with the public health authorities but also with the public works department the irrigation department agricultural agencies and housing authorities.

Is there any incontrovertible evidence of progress in environmental sanitation as the result of WHO's work? Statistics of diarrhoeal diseases which might be expected to show some improvement *pari passu* with improvement in environmental sanitation show no striking reduction in the incidence and are indeed the reverse of gratifying. In many countries these diseases still occupy the first or second place among the causes of death. Deaths from dysentery are still alarmingly high and unfortunately show little change from year to year in a large number of areas. The outbreak of cholera in 1958 in India Thailand Nepal and Pakistan is a grim reminder that the control of epidemics like this dependent as it is on environmental sanitation (and in particular on protection of the water supply) still leaves much to be desired. Great strides have been made in the control of insect borne diseases but there are still many parts of the world which are far from being rid of the great scourges of malaria typhus and yellow fever.

WHO has devoted much time and effort to developing public health engineering units on the ground that a great many pressing problems can be solved only through their use. Progress in the past ten years however is no more than fair and—whether because of low pay unattractive prospects or lack of trained staff—is far less than was hoped for. Nor do the pilot or demonstra-

tion projects provide much evidence of progress. WHO hoped that they would set an example that would quickly be imitated elsewhere and so exert a widening influence on the country's attitude to and practice of environmental sanitation. Far from this occurring their effect even on adjacent populations has been limited.

On the credit side it may be said that much has been done to train personnel at various levels one method that of holding courses to upgrade personnel already in employment having been very successful. The seminars and conferences have aroused much interest opened new and stimulating vistas and led in many cases to action. The technical publications have provided workers everywhere with valuable guides and information of sound scientific quality. And some of the results of collaboration have turned out well. In North Borneo for example where WHO co-operated with the public works department on sewer construction not only have the sewers been built but the department has been left with a number of people whose newly acquired experience will enable them to do this kind of work better in the future.

The future programme

Does this record indicate that WHO's action in the field of environmental sanitation was undertaken on too broad a front with a consequent dispersal of interest and incentive? The report comes to the reluctant conclusion that it does and proposes a more limited objective for the future. A satisfactory programme should fulfil most or all of a number of criteria it should be of ready appeal require the minimum amount of time and energy for its promotion give a more than reasonable expectation of being easily and promptly carried out confer the greatest possible advantages in terms of public health comfort and economic return affect the largest possible number of people depend to a major extent upon the resources of the people require as little health education as possible and need little or no additional research. Of all environmental sanitation activities the only two which meet all

these criteria are community water supplies and community sewerage and the former the more dramatic in its appeal is put forward as the spearhead programme WHO should pursue for the next ten years. In some countries in which the geology and topography do not favour satisfactory drainage provision for surface drainage and excreta removal will have to be made simultaneously. But it will often be found that sewerage systems and other environmental sanitation services will as they have done in the past follow the provision of water supplies. Where water supplies and sewerage systems exist and are firmly established other objectives must take their place, for example stream pollution abatement, sewage treatment, food control or air pollution control. Even in advanced countries, however, large sectors of the population lack an abundant water supply of safe quality not only in rural areas but also in urban areas often of large size.

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quarter to three quarters in different communities and a system of revolving funds would seem to be necessary. With revolving funds totalling \$1 000 000 000 accumulated over eleven years it is estimated that in the first ten years 20 140 communities could be benefited thereafter 1200 new communities each year for an indefinite period.

The programme could be carried out in various ways and would obviously not conform to the same pattern everywhere. Generally however it might be expected to consist of survey planning financing and design and construction phases. In the survey phase WHO could assist governments by supplying consultants either singly or as a team. The planning phase would normally require more than short term consultation. In the larger projects the engineering planning for example might be done by established and experienced engineering consultation firms. WHO could aid governments either by employing or assisting in the employment of the necessary consultants whether legal fiscal or engineering. So too in the financing phase it could supply or help supply expert advisers with experience in administration and in the planning phase furnish technical advice to the designing engineers.

WHO would also make use of such well tried procedures for furthering the programme as seminars expert committees field visits manuals documentary aids training courses illustrations of successful procedures and standard specifications.

Discussion in the Assembly

Some delegations felt that the Director General's estimate of WHO's achievements in the field of environmental sanitation had been unduly pessimistic. Some felt that the provision of water supplies by itself would be rendered nugatory unless provision was made at the same time for the disposal of excess water and human waste since it was unduly optimistic to assume that the one would follow on the other. One delegation stressed that the absence of water supplies in many countries did not signify any lack of technical ability to provide them rather

did it point to the existence of unworkable legal and administrative systems and unsuitable financing systems the improvement of which should be part of WHO's future task. The next five to ten years would be spent most profitably if public and private groups in many areas could be persuaded of the feasibility of rapidly expanding water supplies with local and national resources supplemented by bilateral and international funds. Millions of people could be provided with domestic water supplies if known techniques and accepted fiscal procedures were employed. Another delegation considered it essential that the highest planning authorities in each country should be brought to realize that the provision of an adequate supply of pure water was an integral part not only of health programmes but also of any general programme of economic development. Yet another emphasized that the quality of the water supplied was more important than the method of supply.

The Assembly endorsed the principles and programmes set forth in general terms in the Director General's report and made various recommendations to Member States. Priority should be given in national programmes to the provision of safe and adequate water supplies for communities. Wherever necessary national or provincial water boards should be established and given authority to deal with the various legal administrative and fiscal responsibilities involved in such a programme. All available national and local resources of money materials and services contributing to such a programme should be mobilized. Within each country a revolving fund should be established to provide loans for water supply development to local agencies. Full advantage should be taken of existing international loan funds.

The Assembly authorized the Executive Board to accept contributions offered for the purpose of assisting governments in developing community water supplies and requested the Director General to establish a special account for the purpose. It also requested the Director General to make adequate provision in future programmes and budgets to enable WHO to maintain leader

ship in a co-ordinated global programme of community water supply and to provide the necessary technical and advisory services to governments. Finally it invited all

multilateral and bilateral agencies having an interest in that field to co-operate with WHO in carrying out a global water supply programme.

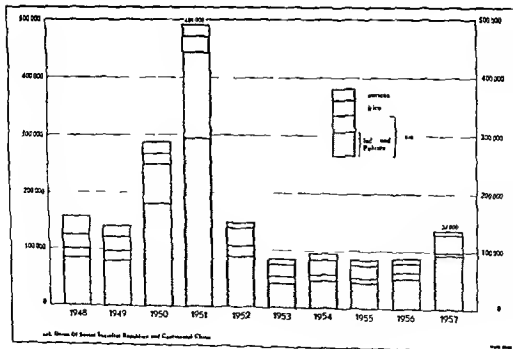
SMALLPOX ERADICATION

Smallpox is a disease entirely suited to a large scale eradication programme. Although eradication has been known and practised for 150 years and is one of the simplest, safest and most effective measures in the field of preventive medicine, smallpox is still endemic in some parts of the world. On the initiative of the USSR delegation to the Eleventh World Health Assembly in June 1958, decided the Director-General of WHO to report on the possibility of a smallpox eradication programme. The article which follows is based on the Director-General's report in response to this request.

Smallpox is still a dreaded disease in many parts of the world (see Figs. 1 and 2) and in 1948 there were more than 200 000 cases in Asia (see Fig. 2). Normally it is absent from the European region. Cases are introduced

occasionally from outside, but the resulting outbreaks are controlled by vaccination and secondary cases are few. Smallpox was mildly endemic in the United States of America before the Second World War but it

FIG. 1. NOTIFICATION OF SMALLPOX CASES BY CONTINENTS, 1948-1957.*



SMALLPOX 1958

- C O 1—9
- 10—99
- 100—499
- 500
- △ 1000
- O 1 per cent

11

was virtually eradicated there during the war years and no case has been reported since 1953. It used to be heavily endemic in several South American countries but in most of these the efficacy of planned mass vaccination has been demonstrated during the past few years. In Central America and the Caribbean Islands smallpox has not been prevalent for several years.

India and East Pakistan contain by far the most important endemic foci in the world and with Burma must be regarded as the most likely source of the smallpox exported to other countries chiefly in Asia and the Eastern Mediterranean area. The Mecca Pilgrimage which hundreds of thousands of persons from all over the world make every year plays a large part in the transfer of infection but so also do ordinary movements of people by land sea and air. Numerous international ports and airports are endemic foci (see Fig. 3).

*It was estimated in 1937 that in spite of the strides made in vaccination less than half the population of India was subject to compulsory vaccination. The exact number of cases of smallpox was unknown since figures for incidence were not available from the princely states which then constituted a large part of the endemic area. While the incidence of smallpox in India and East Pakistan appears to have fallen over the past century there was no sign of a decrease between the years 1954 and 1957. This persistence of the disease is apparently due mainly to the uneven degree of efficiency with which the local authorities whose responsibility it is to carry out vaccination. Lack of thermostability in the vaccine used must also be suspected a defect that will be overcome by the use of dried vaccine. It has been proposed that this should be produced locally with WHO assistance and WHO has in fact already provided a short term consultant to advise on local production in institutes in Uttar Pradesh and Madras.

Other countries of South East Asia report occasional cases of smallpox but the only other large endemic focus in the region is in Burma.

Since the decline of smallpox in the Ameri-

cas Africa ranks next to South East Asia as an endemic area the main foci being in the centre and west. Northern Rhodesia and Nyasaland have a fairly high incidence. The Belgian Congo is an important endemic focus although decreasingly so because of its efficient field medical service. Smallpox is also present in Uganda.

The main West African foci are Nigeria and the area known until recently as French West Africa where the highest incidence has been reported in Dahomey and the Ivory Coast (which adjoin the coast and are at least partly afforested) and Sudan and Niger (which adjoin the Sahara). In Ghana there has not been an epidemic in the savannah area since 1947 but endemo-epidemic cases have occurred in the forest areas. Many pilgrims travel mainly on foot from West Africa to Mecca and there is a constant danger of smallpox being imported into Egypt and the Sudan.

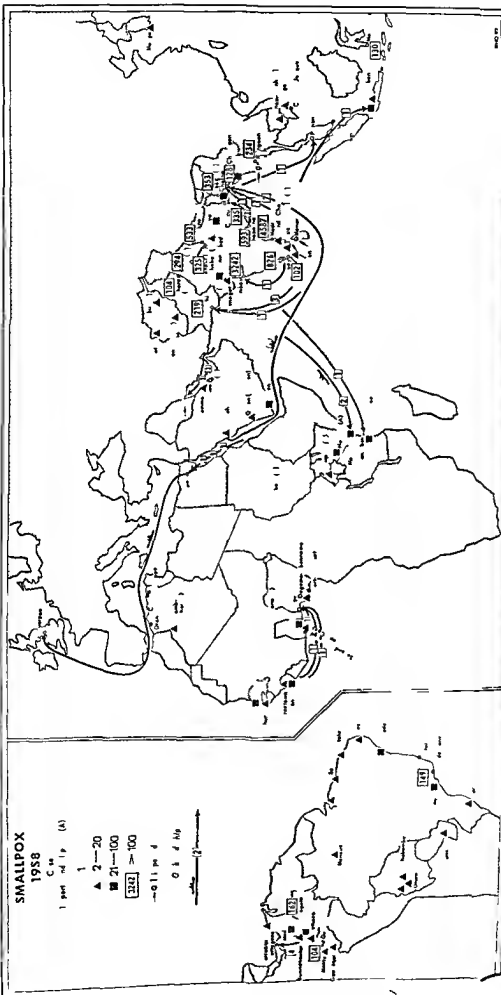
In Iran endemic foci exist in the mountain areas with a cool dry climate and there is some danger from the long frontier with Afghanistan in which smallpox has been heavily endemic. In 1954 smallpox was endemic in Korea and in Cambodia Laos Viet Nam and Thailand. Korea has reported that now it has no endemic foci and the incidence of the disease is decreasing in the other countries just mentioned. In some of the island territories of the Western Pacific smallpox has not re-established itself since dying out before the war.

The technical aspect of eradication

There is general agreement that smallpox can be eradicated from an endemic area if 80% of the population is vaccinated or re-vaccinated within a period of four to five years. The only acceptable criterion of successful vaccination is vesiculation either primary vaccination or the accelerated reaction. The precocious non-vesicular reaction known as the reaction of immunity or immediate reaction is not reliable evidence of actual immunity.

The amount of vaccine required annually for the eradication of smallpox in a country

FIG 3 NOTIFICATION OF SMALLPOX CASES IN PORTS AND AIRPORTS 1958



can and should be calculated in advance so that the most economical use is made of vaccine producing institutions. The amount depends on the population of the area to be covered, the proportion already vaccinated and the anticipated wastage of vaccine. Climate, communications and the percentage of the population in rural and urban areas must all be taken into account in deciding the proportions of dried and glycerinated vaccine to be used.

It is believed that for mass vaccination especially in tropical and remote rural areas freeze-dried (lyophilized) vaccine prepared by the Lister Institute technique gives the best results since it remains viable for at least three months at 37°C and for at least eight weeks at 45°C. There is no difficulty in teaching semi-educated and uneducated vaccinators to use it.

The production of Lister type dried vaccine requires high standards of skill and responsibility in the professional and technical staff employed which must therefore be carefully selected for both qualifications and character. Some countries have experienced difficulty in finding suitable staff. The staff selected must be given fellowships for training. There are at present very few institutions where this type of training can be given.

Although the thermostability of Lister type vaccine is outstanding, dried vaccines prepared by some other processes satisfy the minimal requirement of stability for four weeks at 37°C. Most of the dried vaccine for the successful campaigns in Central and South America was produced by techniques developed in the United States of America.

A highly qualified consultant is required for two to three months to set up a freeze-dried vaccine laboratory. Few such consultants are available at present and those who are are heavily committed so that the number of producing units that can be set up each year is limited.

The quality of the vaccine produced must be continually checked so as to maintain the standards laid down by the WHO Study Group on Recommended Requirements for Smallpox Vaccine. Testing requires skill and time.

One lyophilization unit produces, if all goes well, some 1 500 000 doses of vaccine annually. To do this a full professional and technical staff including a highly qualified director is required. In hot climates an air-conditioned laboratory may also be necessary. Overhead costs per dose will be lower if several units are grouped together and veterinary and other vaccines may therefore be advantageously produced in the same institution.

In these circumstances WHO assistance it would appear should be devoted to setting up a few comparatively large and efficient institutions rather than many small ones of dubious efficiency.

Glycerinated vaccine lymph will continue to have its uses. If refrigerated storage and transport are available it offers the advantage of being cheaper and easier to produce than freeze-dried lymph and of being issuable in single-dose containers.

Post-vaccinal encephalitis

The most dreaded complication of vaccination is post-vaccinal encephalitis which occurs most commonly after primary vaccination in adolescents and young adults. The reported incidence varies from as much as 1 case to 3000 vaccinations to no cases after several million vaccinations carried out in some countries in South America.

Human immune gamma globulin is under trial in the Netherlands for the prevention of post-vaccinal encephalitis. Results so far suggest the possibility of a successful outcome. In the USSR hyperimmune gamma globulin of very high titre is being produced from animals. This would be easier to obtain than human gamma globulin and the possibility of producing it elsewhere is being examined. Apart from preventing post-vaccination complications it may be useful for aborting overt smallpox in unvaccinated contacts and for treating cases. The Study Group on Recommended Requirements for Smallpox Vaccine has recommended that gamma globulin be made subject to an international standard.

The best prophylactic against post-vaccinal encephalitis is primary vaccination in the very first years of life.

The smallpox service and campaign

Some countries such as Indonesia have a separate vaccination service but in most a smallpox eradication service will have to be integrated with the general public health service although it must be directed or at least co-ordinated centrally. There must always be someone charged specifically with responsibility for smallpox eradication both at the national and provincial levels to ensure that the work is properly done throughout the country.

The work of the smallpox service should include the mass vaccination campaign, a health education drive to explain clearly why the campaign is being carried out, the diagnosis and isolation of cases of smallpox and surveillance of contacts and all aspects of quarantine. In some countries legislation regarding vaccination will have to be introduced.

A detailed programme of the campaign should be prepared. Technically a campaign lasting four or five years is ideal (this being roughly the length of time for which successful vaccination confers full immunity). The timing of the campaign should be co-ordinated as nearly as possible in adjacent territories and should be laid down in advance.

The first stage in building up the smallpox eradication staff must be the recruitment of a directing cadre of ability and enthusiasm who must have the initiative and drive to carry through the campaign. This directing cadre must be drawn from the country itself though WHO may provide epidemiologists or laboratory workers as short-term consultants.

Medical supervision of the vaccinators' work is necessary and there should be sufficient full-time medical officers for any inspector to call one out reasonably quickly in an emergency. The work of the vaccinators must be supervised constantly and strictly by inspectors who are on sympathetic terms with the men under them. It may be hard to find sufficient men of the calibre and integrity required for inspectors. One inspector can usually supervise from seven to ten vaccinators though the number may be

as few as four in a particularly scattered rural area.

Mass vaccination may be carried out from house to house or at fixed attendance points. The latter method enables the vaccinators to perform more vaccinations per day but experience indicates that nowhere near 80% of the population attends. The house-to-house method requires greater effort and more intensive work but ensures a better coverage of the population. This method has been followed in several countries which have already successfully achieved eradication by mass vaccination and is being followed by other countries at the present time.

It is most important to calculate the average number of vaccinations that one vaccinator can perform annually or daily in the conditions prevailing in his area of operation since the whole timing and staffing of the campaign depend on this. The average varies greatly: it is only 7000 a year in one rural area in Africa with individually scattered houses and a long immobilizing wet season; it is 22 000 and 15 600 a year respectively in two Eastern Mediterranean countries; in South America it is 60 80 daily as a general average and in urban areas it may be as much as 150 250 daily. The nature of the communications and the type of transport are important factors in the output of the vaccinators.

Vaccination campaigns may where appropriate be combined with other campaigns. They combine particularly well with jaw campaigns as has been found in Haiti and Nigeria.

The task of WHO

For WHO to stimulate and co-ordinate the work of smallpox eradication throughout the world it must establish contact with all institutions and consultants capable of assisting in this task. There are very few institutions where proper training in the production of freeze-dried vaccine is possible and these are also the only institutions where the quality of freeze-dried vaccine from WHO-assisted laboratories can be checked.

Moreover the very few persons qualified to help as short term consultants in the setting up and periodic inspection of new WHO-assisted laboratories producing the vaccine are likely to be on the staff of these institutions. Careful administrative planning will consequently be needed to use to the best possible advantage the facilities that these institutions may be willing to offer.

WHO must organize training courses in vaccine production centrally since in this way participants from several regions can be brought together and the maximum use made of the services of the consultant instructors. This will also avoid undue pressure on the institutions to take individual fellows for training. WHO must also organize inter regional conferences from time to time to facilitate co-ordination of the work in different regions. Epidemiological consultants should be recruited centrally so as to dovetail short term appointments of this type and make the most effective and economical use of the experts available.

Financial aspects

It is difficult to present an over all picture of the financial provisions being made at present throughout the world for smallpox control and eradication mainly because in many places expenditure on smallpox control cannot be separated from the general public health budget of which it forms an integral part.

In working out a campaign budget it should be possible to calculate the *per capita* cost of vaccination and apply this to the whole country by cautious extrapolation. This has been done in Colombia and elsewhere. In Colombia a mass vaccination campaign was started in 1955 with the aid of PAHO and UNICEF and is planned for completion by 1960. The campaign is under the direction of the Ministry of Health but has its own full time staff of 3 medical officers, a paymaster, 11 inspectors, 110 vaccinators and 14 drivers. The work is done by mobile teams going from house to house. Motor transport is used and also horses for the rural areas. The average

number of vaccinations carried out by each vaccinator is 60-80 per day and the average cost is estimated to be about 8 cents (US) per vaccination.

More information will be needed before the approximate cost of eradication can be calculated for most countries but the following table showing the average cost per vaccination in some countries which have supplied figures is useful as an approximate indication.

Country	Vaccination per centum	Estimated average per vaccination in U.S. dollars
Colombia	60-80 per day	0.08
Ecuador	60-80 per day	0.07
Iran	2,000 per year	0.08
Korea	—	0.08
Peru	60-80 per day	0.10
Philippines	65-80 per day	0.10
Thailand	—	0.075
Venezuela	60-80 per day	0.11

These figures are all based on house-to-house vaccinations and include the cost of personnel transport and miscellaneous supplies and equipment but not of vaccine which is difficult to calculate but is in any case low.

Discussion in the Assembly

The Director General's report on smallpox eradication was discussed at length in the Twelfth World Health Assembly. It was pointed out that one of the difficulties in the way of making better use of vaccination was the lack of co-operation on the part of the public. This was due partly to ignorance especially in the less developed communities, partly to prejudice against vaccination, a feeling that was still strong in certain quarters, and partly to apathy, a marked feature in communities that had not had smallpox epidemics for many years. One delegate said that his country had no statistics for smallpox but he believed that there might be thousands of cases every year. Vaccination had begun some fifty years ago but since an imported wet vaccine was used roads were few and far between and transport facilities were bad its use was confined to a limited area. Many of his countrymen still thought

that smallpox was a punishment inflicted by God many others that it was due to medicine imported from abroad Not only were there numbers of people who refused to be vaccinated with imported vaccine but there were also numbers who deliberately infected themselves with fluid taken from cases often with disastrous results He foresaw that it would be a long time before legislation could be enacted to make vaccination compulsory

The Assembly emphasized the urgency of achieving world wide eradication and

recommended that the health administrations of the countries where the disease is still present organize and conduct eradication programmes as soon as possible making provision for the availability of a potent stable vaccine It also requested the Director General of WHO to offer the necessary technical guidance and advice and to provide in his programme and budget for future years for the necessary activities to further smallpox eradication programmes and for the assistance requested by national health administrations for this purpose

HEALTH EDUCATION OF THE PUBLIC

Report of the Technical Discussions at the Twelfth World Health Assembly

Health education of the public was selected as the subject for the technical discussions held in conjunction with though not subject to official action by the Twelfth World Health Assembly This choice and the excellent participation in the discussions are evidence of the increasing interest of health leaders throughout the world in health education which is now being recognized as an essential element in any health programme

Seminars or technical discussions on the subject have already taken place in each of the WHO regions Health ministries and other agencies engaged in health education in a number of countries participated widely in preparations for the technical discussions at the Assembly

To facilitate these preparations a suggested outline for use by countries in discussing health education of the public¹ was sent by the Director General of WHO to Member States It was suggested that this outline be used as a basis for discussions of the subject at the national provincial and local levels and that summary reports of the views expressed be sent to the Director General for the use of participants during the technical discussions

In addition the International Union for Health Education of the Public agreed to ask its members to take part in preparatory discussions using the above mentioned outline and to transmit reports to WHO A total of 61 countries and 3 non governmental organizations submitted reports of the discussions in their respective countries and organizations But even these figures give only a small idea of the amount of interest aroused and the extent of the preparatory activity In one small country conferences using the outline were conducted in all the provinces subsequently a national conference was held at which the final report for transmission to WHO was prepared Another country's summary was compiled from 53 reports submitted by local meetings The report from one of the non governmental organizations contained separate statements from 31 organizations

Using the reports which had been received by 1 January 1959 the Secretariat compiled a Background document based on summary reports received from countries This document

Unpublished document A12/Tech 1 Doc 1
 Published document A11/Tech 1 Doc 2

ment gave detailed examples of practical approaches to health education and recounted some of the wide variations in practice in different countries in respect of programme planning and operation training of health personnel in health education of the public and organization and administration of health education services. It also listed a variety of health education problems on which research is needed.

The document was sent by the Director General to all Member States for their delegates and was available during the group discussions. In fact, the final section "Suggested topics for discussion" was used by practically all the groups.

Dr A. Lakshmanaswami Mudaliar, Vice-Chancellor, Madras University, India, served as General Chairman for the technical discussions. He presided over the plenary sessions and gave general guidance to the Chairmen of the small discussion groups.

A total of 184 people registered for the group discussions during which eleven working groups spent approximately seven hours each discussing various aspects of health education.

Three well-attended plenary sessions were held: one to introduce the subject, a second at which a lecture on new techniques in health education was given, and a final session at which the reports of the discussion groups were considered.

FIRST PLENARY SESSION

Opening the session, the General Chairman referred to the origin of technical discussions as a feature of the World Health Assemblies. He recalled that following the Third Assembly, the Executive Board had agreed that it would be desirable to give special attention each year to some important aspect of the general health programme. The first technical discussions held at the Fourth World Health Assembly dealt with the education and training of medical and public health personnel. At later Assemblies the following subjects were discussed: the economic value of preventive medicine and the methodology of health protection for local areas; modern health techniques in the control of tuberculosis, syphilis and the typhoid group of fevers; public health problems in rural areas; the education and role of nurses in health programmes; and the role of the hospital in the public health programme.

The discussions were then introduced by a panel which included a nurse, a public health administrator, a public health engineer, a health education specialist and a WHO consultant, i.e. Miss A. Wagner, Director, School of Nursing, Central School of Copen-

hagen County, Denmark. Dr G. Arborea, Secretary of Health, Puerto Rico Department of Health, San Juan, Puerto Rico; Mr H. M. Bosch, School of Public Health, University of Minnesota, Minneapolis, USA; Dr V. S. Erchov, Head of Department, Central Institute for Scientific Research, USSR; and Dr M. Derry, Chief, Public Health Education Services, Department of Health, Education and Welfare, United States Public Health Service, Washington, D.C.

The first point stressed by the panel was that the success of many public health programmes depends on health education of the public. It was asserted that health education is "the key to the solution of many health problems involved in the humanitarian task of the World Health Organization" and "the most powerful weapon we have in the field of health". Instances were cited where sanitation programmes succeeded because of effective health education or failed for the opposite reason. It was pointed out that while the value of fluoridating water supplies is well known and the process presents no technical difficulties, lack of effective health education deprives many people of the benefits of this measure. The success of the new WHO programme for providing piped

water supplies will likewise depend to a large extent on the adequacy of the education that accompanies the sanitary engineering phase of the programme

The need for careful and detailed planning of the educational side of a health programme was also stressed by the panel. Factors to be taken into account include targets, methods, materials to be used, synchronization of educational measures with the rest of the programme and evaluation procedures. The following points should be considered: (a) extent of the public's knowledge of the subject; (b) misconceptions they may hold; (c) additional information they may need; (d) the best way of making new information available; (e) ways of ensuring that new knowledge is being learned and resulting in positive action.

The panel emphasized the importance of participation by all members of the health team in the planning of health education programmes. In this way all concerned can fully understand their role in the programme and the contribution they can make. Moreover, people who take part in planning a programme generally have a strong personal interest in its success.

The panel members agreed that all doctors, nurses, midwives and sanitarians and other paramedical personnel have an educational responsibility. The doctor, when he advises a patient or meets a group to discuss a problem, they share in conducting health education. The nurse, whether giving advice in the home, taking part in a group meeting at the clinic, serving an industrial group or providing hospital care, has many opportunities for health education, both organized and informal. The sanitarian also has many opportunities for health education in his work. Although all the health workers mentioned have educational responsibilities, they are nevertheless specialists in medicine, nursing or sanitary science, not in education. It is thus the task of the specialist in health education to contribute to the health team specialized knowledge about educational methods and techniques.

It was stressed that instruction in health education should be included in the basic

curricula of schools of medicine, nursing, sanitary engineering, public health, etc., and should continue during in-service or on-the-job training.

In the training of personnel for health education work, practical experience of teaching in the home, health centre, classroom or community is an essential addition to classroom instruction on methods and techniques of health education.

Various methods of co-ordination were mentioned. These included a centralized system of programme development, some type of co-ordinating council or an informal planning group. Genuine co-operative effort that assists people to understand and solve their own problems was felt to be more important than the method of co-ordination.

The need for fundamental research by the social scientists on the factors influencing human behaviour and particular health practices was emphasized. Some countries are carrying on limited studies in health education, but much more intensive work in this field is badly needed.

* * *

Following the panel discussion, the Chairman requested Mr. L. Viborel, Secretary General of the International Union for Health Education of the Public, to report on the recent Conference on Health Education held at Dusseldorf, Germany, under the sponsorship of the Union. Mr. Viborel stated that the theme of the Conference was:

Health education of children and adolescents, and attention had been focused on three problems of special importance: co-operation, professional training and research.

The Dusseldorf Conference stressed the need for more fully developed co-operation between health services, schools, professional bodies and the non-governmental organizations concerned with public health, particularly where the health education of children and adolescents was concerned. It recommended the formation of local health

committees to include members of the various groups and professions participating in health education.

With regard to professional training the Conference recommended greater attention to health education in medical and paramedical studies and particularly stressed the importance of health education training for schoolteachers.

The Conference also recognized the increasing interest in intensifying health education research as a means of achieving more effective programmes. It advocated enlisting the collaboration of psychologists and sociologists to assist in developing and conducting research in this field.

In tribute to the work and leadership of the World Health Organization in the field of health education Mr Viborel said the International Union for Health Education of the Public was proud to participate in the Organization's health education work.

The General Chairman then reminded those present that participation in the discussion groups would be informal and that those taking part would be doing so as individuals and not in any official capacity.

SECOND PLENARY SESSION

At the Second Plenary Session Dr W Emrys Davies Headmaster Yew Tree Secondary School Wythenshawe Manchester England Education Officer to the Central Council for Health Education England from 1927 to 1956 demonstrated some new techniques used in health education. He showed several interesting visual aids including flannelgraphs that may be used to simplify the presentation drawings to test word meaning and a revolving cut-out of a ship to illustrate how one's past experiences influence what one sees in a given situation. Some of the main points in Dr Davies' address are given below.

The task of the health worker in his health education effort is to encourage everybody to take that action that will assure the health, happiness or well being of himself and those close to him. Therefore health education

should be judged by what happens to people rather than by the amount of materials used and distributed.

The action that people take is based on a personal decision. That decision depends on a favourable attitude. Hence in education it is not enough to give people information or knowledge. They must be brought face to face with responsibility for their own health. In other words they must achieve insight. The learner must share with the teacher in the development of the solution of a problem that is there must be participation.

All people are unique personalities with different wants, different capabilities, unique background of experience, differing understanding of language. Therefore the health educator must know the people with whom he is working. Because words mean different things to different people it is necessary for him both to check what people understand by what he says and to use simple visual and other means to illustrate the information he provides. Such material needs to be clear, accurate and inexpensive, to be made in the region where it is to be used and to be tested out with the people for whom it is intended in order to avoid misunderstanding. In his enthusiasm to convince people of the importance of a health fact the health educator should not use words or visual aids that exaggerate the truth.

In their educational approach health workers should not assume a superior or authoritarian attitude but should behave as partners in the solving of a problem. Suggestions should be made in a way that allows the learner to accept them within his own frame of behaviour. As educators health workers must maintain their own serenity and not become involved emotionally.

There are many groups—religious, social, leisure, working, etc.—with similar interests. It is with these natural groups that health educators should conduct group discussions, assisting them to make decisions about their own individual and group health behaviour. Such groups require understanding leaders who can serve at the same time as partners and advisers to their members.

GROUP DISCUSSIONS

The Chairmen and Rapporteurs of the eleven discussion groups were

- Group 1 Dr B M Clark Deputy Chief Health Officer Union of South Africa (*Chairman*) Dr V Ramakrishna Assistant Director General of Health Services (Health Education) India (*Rapporteur*)
- Group 2 Professor G A Canapena Director of International Relations and Cultural Activities Ministry of Health Italy (*Chairman*) Professor Dorothy La Salle Professor of Physical and Health Education Wayne State University Detroit Mich USA (*Rapporteur*)
- Group 3 Dr H B Turbott Deputy Director General Department of Health New Zealand (*Chairman*) Dr D A W Nugent Specialist Hygienist Ghana (*Rapporteur*)
- Group 4 Dr J N Rodriguez Directeur of Disease Control Philippines (*Chairman*) Miss Mary J Kraft Health Education Adviser United States International Co operation Administration (*Rapporteur*)
- Group 5 Dr C Diaz Collier Director de Estudios Experimentales Secretaria de Salubridad y Asistencia Mexico (*Chairman*) Dr S Haraldson Medical Officer of Health Sweden (*Rapporteur*)
- Group 6 Professor E J Y Aujaleu Directeur general de la Sante publique au Ministère de la Santé publique et de la Population France (*Chairman*) Dr E Dühr Medecin Inspecteur de la Sante publique Luxembourg (*Rapporteur*)
- Group 7 Dr J Anouti Director General Ministry of Public Health Lebanon (*Chairman*) Miss Annette Le Meitour Chief of Publications League of Red Cross Societies (*Rapporteur*)
- Group 8 Dr Robert Yoho Director Health Education Records and Statistics Indiana State Board of Health USA (*Chairman*) Mrs Kate Katzki International Conference of Social Work (*Rapporteur*)
- Group 9 Li Col J Singh Director General of Health Services India (*Chairman*) Mrs Sally L Smith International Conference of Social Work (*Rapporteur*)
- Group 10 Dr G F Amyot Deputy Minister of Health Department of Health and Welfare Victoria Canada (*Chairman*) Dr Agnes Singendook Federal Committee for Health Education of the Public Germany (*Rapporteur*)
- Group 11 Dr C M Norman Withams Chief Medical Adviser to the Federal Government Nigeria (*Chairman*) Dr J D Hounihane Deputy Chief Medical Adviser Department of Health, Ireland (*Rapporteur*)

The reports of these groups are summarized below

* * *

In my opinion health education is as important as teaching people to read and write said a member of one group. In my country people need to learn what to eat, they need to understand the importance of clean water. Who will teach them?"

I am responsible for organizing health education throughout my country said another. Nothing exists. How will I start? On whom will I call to teach the population? On the doctors? On the nurses? On the teachers? Who will co-ordinate the programme? And above all who will teach those who are to teach the population?

A health administrator remarked. I can count neither on my doctors nor my nurses for the health education of the public. They have no time. I need specialized health education teams.

These are typical of the practical and realistic problems raised during the group discussions.

Those groups which sought a definition of health education were generally agreed that it is more than mere information or propaganda. It is a continuing and active process of learning by experience. It is one of the fundamental public health methods that assist in achieving the goals of a public health programme. It is not a programme distinct from other public health programmes.

Planning and operation of programmes

The groups emphasized the importance of planning as an essential element in effective health education. As one group expressed it. Planning is the oil which enables the programme to work smoothly and effectively."

Elements to consider in planning include the importance of the health problem, the economic consequences of the problem, the role of health education in the solution of the problem, a clear definition of the population group, the programme will affect the knowledge, attitudes and behaviour of the

people in this group local conditions including customs habits religions beliefs etc a clear statement of objectives including what is to be taught and to whom the proper timing of health education in relation to the provision of health services acceptability of the programme to the community availability of funds and personnel possibility of getting support from international organizations From such data it is possible to make an "educational diagnosis" and prescribe the necessary "educational treatment"

However it was felt that caution was required on two points First over zealousness in the conduct of health education may result in demands that will overtax the resources of the community thus causing adverse reactions to the health programme and destroying the people's confidence in the health authorities secondly the health education adviser should take into account the implications for other social programmes operating in the community that may require financial support for their success

It was generally agreed that all personnel who are to take part in the programme should also take part in the planning This enables them to determine the contribution they can make Furthermore community leaders as well as the beneficiaries of the programme should be asked in advance for their advice Teachers and other persons in contact with the people form an important health education resource which should not be overlooked

Several groups called attention to the need for flexibility in planning so that procedures can be varied to take into account differences among communities or unexpected situations that may arise

Three groups considered the degree to which communities can be led to take health action The use of legislation was suggested but it was noted that when health laws are enacted there is need for health education to make them more acceptable to the people One group discussed the use of competition between individuals and social groups The success of this method in particular areas of the world was cited but the group observed

that there was a potential danger in competition as a motivating force since it may produce unhappy feelings in some people and the emotional reactions may lead to failure The group agreed that competition is usually unsound It might be useful to some extent between institutions or communities but not between individuals

The groups were agreed that the methods employed in health education for any group will depend on local factors No one method can be applied effectively in every circumstance Practical methods for each situation should be developed by the community with the guidance of health education specialists if available

Some of the groups comments on specific methods are given below

(a) *Surveys* If these are carried out by the people they often stimulate both interest and action but unless local investigation can be followed up by appropriate services the confidence of the people may be lost

(b) *Enlisting key individuals to demonstrate better health practices* This method is often useful but a thorough understanding of the community is necessary in order to avoid choosing the wrong individual or family as a model and to prevent jealousies and misunderstandings of the motives for the choice

(c) *Group discussions* Several reports mentioned the effective results obtained when local groups discussed their problems and made their own decisions about improvements This method is only useful when the groups meet together naturally and have common interests and similar problems

(d) *Lectures and formal teaching* were not considered as ideal methods but where they are used they should be simple clear and not too detailed They are usually most effective if given to groups with a special interest rather than to general groups Good questions put at meetings can introduce new ideas but it is more effective if they are introduced casually

(e) *Campaigns* The effectiveness of campaigns in producing any real change in

health habits was questioned. A succession of campaigns should be avoided as the population is apt to become surfeited.

(f) *Person to person education* Discussions between the health educator and individual members of the public were recommended as the most effective means of education, as for example in the interviews conducted by doctors, nurses, sanitarians and health education specialists.

A few groups considered types of health education material and their place in the programme reaching the following conclusions: to be effective, health education materials should not consist of dead museum exhibits but should show things in a lively way, local colour being added to arouse interest; materials obtained locally for specific objectives and needs usually produce better results than more costly materials produced at a central office; exhibitions are of little interest to urban populations but still retain their value in small centres and rural areas; the flannelgraph appears to be an excellent medium for health education; in under developed countries radio and films are likely to have a much greater impact than the press, as sufficient time is rarely allowed for testing materials before they are used; such testing should be done among the groups or population for whom the programme is intended.

Several groups felt that the value of materials was not to be measured by their cost. Inexpensive materials properly used should be the aim. By adequate budgeting and judicious selection, a proper balance can be achieved between expenditure on materials and expenditure on the essential task of training people to use them.

There was general agreement that in the planning of health education provision should be made for evaluation of efforts from the very beginning. Health education activities should be subject to the same degree of critical evaluation as all other activities in the programme.

It was pointed out that a real evaluation of health education is extremely difficult. To evaluate in statistical terms the objective

has to be clearly defined and units of measurement need to be developed so that results can be checked against the aims of the health programme. What is particularly difficult in the evaluation of health education is to determine its contribution to a successful result in relation to other factors. Perhaps the best indication is the extent to which the people participate.

It was suggested that WHO might assist in the evaluation of health education and act as a clearing house to provide administrators with the experiences of others in such evaluation.

Training of health personnel in health education

Discussions on training centred around three major topics: health education training in the basic preparation of health personnel; continuing or in-service training in health education; and the responsibilities and training of the health education specialist.

There was complete agreement among the groups that all health workers—physicians, nurses, midwives, health visitors, social workers, engineers, sanitarians and their auxiliaries—have responsibility for the health education aspects of the services they render and of the programmes in which they participate.

In addition, it was recognized that teachers, recreation and youth workers, agricultural extension workers, fundamental education specialists, publicity and public information workers, community development workers, community leaders and others have an important contribution to make to the health education of the public.

Several of the discussion groups worked out in detail the training each category of personnel required to discharge this responsibility effectively. It was considered desirable that their training should equip them with knowledge of how people learn (the problem of motivation and resistance in health matters), an understanding of the importance of traditions, habits, values, superstitions and the general way of life of any community, its power structure and leadership, a know-

ledge of methods of ascertaining such information skill in the use of education methods and media skill in human relations and teamwork

There was general agreement that training in health education should be a regular part of the curricula of the various institutions responsible for the preparation of professional health workers. In several groups it was pointed out that in some eastern European countries all public health physicians are required to take post graduate training in health education. In their work as members of salaried medical services they must then devote a certain number of hours to health education each month. In other countries however where doctors do not receive a salary but earn their living by private practice the trend is definitely towards a greater interest in clinical medicine and medical training is geared towards this end. In these countries changes need to be introduced in the curricula of medical schools in order to arouse the interest of the students in preventive and social problems. Some encouraging local experiments were mentioned where students are assigned to a family or group of families in the community as medical observers rather than advisers. It was considered that such programmes should be encouraged so as to produce in the future medical practitioners concerned with public health and social problems who can co-operate in health education activities to a greater extent.

Unanimous agreement that training in health education should be given to all health personnel as part of basic professional preparation was accompanied by an equally unanimous recognition that this would not be easy to accomplish. Some of the obstacles mentioned were the difficulty of trying to change long standing educational traditions the difficulty of trying to change the attitudes of teaching staff particularly senior members of the faculty the shortage of highly qualified health education specialists to do the teaching shortage of funds the possible prolongation of study time in an already overcrowded curriculum the revision of curricula a task which demands research and thorough ana-

lysis of existing programmes and future aims

Continuing in service training was considered by all groups to be vital to the development of effective health education. Such training is needed not only for newly prepared workers but is especially required for older personnel who may have had no health education training in their basic professional preparation. The groups made various concrete suggestions inclusion of provisions for in service training in the budget and programme of health administrations recruitment of an adequate qualified teaching staff integration of health education into every further training programme publicizing successful seminars or similar meetings in order to increase the demand for in service training in health education by health workers keeping in touch with field workers through monthly newsletters or bulletins provision of fellowships careful selection of staff members to attend seminars so that they can share experiences and information with their fellow workers when they return conduct of seminars and study groups in a manner that provides for the active participation of all members rather than reliance on formal or didactic meetings.

It was pointed out that it is often better to provide training in the rural health centres than to bring staff to the urban areas where they are tempted to remain. Wherever possible in service training should be carried on in such a way that the health workers can all be lodged in common quarters. Such an opportunity for the informal sharing of experiences and frank discussions helps the health worker to improve in his profession and develop as a human being.

In one group a participant described a unique combination of academic and in service training. A seminar was arranged in which students of an advanced health education course were able to discuss the content and methods of health education of the public with practising health workers of different disciplines in a different country from the one in which the course was held. This procedure stimulated the health workers to learn more about health education and gave the students experience in adapting

what they had been taught to conditions in a new country

Health education seminars were suggested as a useful means of persuading administrators of the value of in service training in this field. It was also suggested that WHO experts might be asked to start national health education training programmes and to sponsor meetings of health education specialists and health administrators to bring them up to date on new techniques methods principles etc

It was generally agreed that there was need in every country for at least a limited number of health education specialists. One group felt that such personnel are needed at all levels of health organization though it was recognized that it would not always be practical or possible to use highly skilled staff at the local level. In general it was considered that the health education specialist should be a highly qualified person capable of working on equal terms with programme directors and administrators as an adviser or consultant

The duties of the health education specialist were considered to be assisting health staff and others to plan and carry out the health education side of their programmes organizing and participating in health education training programmes assisting with the selection preparation pre testing distribution and utilization of appropriate teaching aids and health education materials co ordinating all health education activities in the health organization enlisting the advice of anthropologists sociologists psychologists and psychiatrists whenever their special skills will contribute to more effective health education

There was not complete agreement concerning the qualifications needed to perform adequately the duties of a health education specialist. Some participants thought that he should be a doctor in order to have higher status and greater influence with the authorities. Others concluded that he need not necessarily be medically qualified and one group considered that if the health education specialist is to teach medical training is wasted on him

Despite this lack of agreement on the basic professional training required all were agreed that the health educator needs a university education or its equivalent with a sound knowledge of the behavioural sciences and educational methods including audio visual techniques. He should have strong leadership ability be genuinely interested in people and their problems be warm and outgoing and want to make health education his vocation

It was pointed out that most countries could anticipate having in the near future only a relatively few qualified health education specialists consequently they should be carefully selected and their training well planned as a part of a long range programme

It was recommended that only experienced and mature health workers with some years of practical health education work in their own countries should be sent abroad for specialized training

WHO was commended for its sponsorship of training in health education and it was hoped that the number of trainees might be increased each year

Organization and administration of services

There was complete agreement on the desirability of a health education unit at the national level to co ordinate the work of health education throughout a country. A majority of the groups felt that this unit should be a part of the central health administration though others were of the opinion that the task of co ordination could be entrusted to private agencies working in co operation with the official health administration. It was suggested that in some countries technical units of health education might be desirable in the official education agencies as well as in voluntary health agencies. While agreeing that there should be some type of health education unit in every country the groups all pointed out that the great differences in culture educational levels of the people and financial resources made it necessary for each unit to study its own situation and develop the type

of administrative structure best suited to its own needs and problems

The general services expected from the health education unit are participation with other technical units in planning for and carrying out the health education aspects of health programmes assistance with the organization and conduct of in service training in health education for health workers in the Ministry of Health and in related agencies studies of the health education needs of the country or area served promotion of co ordination between similar services in other government departments (education social affairs and social insurance) and in voluntary and professional health organizations direct co operation on the school health programme with the department of education planning and developing appropriate teaching aids and health education materials conducting health education demonstrations for the improvement of methods and material

Although the exact position of the health education unit in the organizational structure of the country would vary it was the general consensus of opinion that the unit should be placed at an administrative level which would grant it enough executive authority to carry out its own activities and to establish working relationships with both the public health and curative medical services It should have sufficient independence to be able to offer technical advice without the necessity of going through a multiplicity of administrative channels

Most members felt that the central unit should act in an advisory capacity where there are health services at the provincial and local levels A few expressed the view that local units should not enjoy too much autonomy but should be executive organs carrying out field activities in accordance with an agreed policy

The participants felt that depending on the need and resources of the country the central unit should be staffed with health education specialists doctors teachers information specialists and personnel specializing in the production of materials Sociologists cultural anthropologists and psychologists

could also serve on the health education staff

Most groups believed that the administrator should be a physician specializing in public health and having a comprehensive training in health education It was pointed out that in some countries professional health education specialists—not necessarily doctors—have helped to raise health education activities to a highly satisfactory level

Several groups discussed health education auxiliaries as members of the health education staff But the term did not have the same meaning to all the groups To some "auxiliary workers" referred to fully trained paramedical personnel such as nurses and health inspectors to others the term meant volunteers who participate in community health education efforts and to still others it meant sub-professional workers with a limited amount of training in health education

There was no agreement about the role of the sub-professional worker One group felt that the use of such poorly prepared personnel was definitely inadvisable The funds devoted to their employment could better be spent on paramedical personnel who could render services to the population and at the same time carry on health education Others mentioned that in under developed countries such workers could make contact with a large mass of the population who cannot be reached by the more specialized staff All those who felt that informally trained personnel should be utilized stressed the need for the closest possible supervision and guidance of their activities by professionally qualified health education specialists One group considered that although all health workers should be encouraged to engage in health education in the course of their regular work they ought also to be warned against dealing with matters outside their competence The warning applies especially to those of sub-professional grades This temptation is especially strong where for example the only representative of the health department to visit a village over long periods is the sanitarian or health education auxiliary who may be regarded as a "doctor"

and asked for advice on many medical matters

The question of maintaining staff morale was considered by only a few of the groups. Some of their suggestions in this connexion were as follows: regular staff meetings or conferences both general and at each level of the service should be held for the exchange of views and the solution of problems; the administrative staff should take an interest in the work of the health education specialist; have a thorough knowledge of what is being done in health education and be willing to give constructive assistance with any problems that may arise; steps should be taken to see that the significance of health education is appreciated by the entire health department staff and that the administrative structure is one in which the health education specialists and the rest of the staff can work harmoniously together.

The participants were all agreed that health education like all other branches of public health work seldom has enough funds for sufficiently intensive activities. In general it was felt that the central budget should provide for specialist health education services as well as for routine activities in this field. In the budgets of other divisions—e.g. those dealing with communicable diseases—provision should be made for the required additional educational services and materials. Where possible the central budget might be supplemented by provincial and local funds or from private sources.

It was emphasized that if there is a separate appropriation for health education services there must be close co-operation with the special technical divisions of the programme as regards the preparation of suitable educational material and the organization of other educational activities.

All groups mentioned the important role that voluntary health agencies play in health education of the public. One group stated: "Voluntary agencies are made up of individuals who for one reason or another have a greater interest and concern with a specific health problem than does the average person. Because of this specific interest their action is frequently guided by their emotions. This

often results in undue emphasis on one problem and duplications or omissions in other areas of public health. However the important concept is that these voluntary agencies are resources that can be utilized to give strength to the health movement in a given country.

Tribute was also paid to the contribution of universities of professional groups such as medical nursing and pharmacists associations and of teachers religious leaders and others.

However some groups stressed that before these agencies can make their full contribution to health education there must be co-ordination both in planning and in action. Otherwise conflict or duplication of effort will limit the effectiveness of their activities.

A variety of methods to achieve such co-ordination were described. In some countries there is an association of voluntary agencies which works with the official health agency. In others co-ordination is ensured by a national committee consisting of both official and non official agencies. Where there is a centralized highly organized administration for health education work co-ordination is naturally one of its functions. Elsewhere effective co-ordination is achieved through the granting of subsidies by the central authority to assist the health education work of local and non governmental agencies. When this is done the subsidizing authority must obviously satisfy itself that there is a reasonable measure of co-ordination before the grant is paid.

Regardless of the method of co-ordination the best results are achieved where good human relations exist and the agencies are more concerned with results than with prestige.

Several groups considered the unique role of the press which sometimes expresses views that may be in conflict with the health authority. Two positive suggestions were made in this connexion. Health administrators might hold periodic conferences with the public and the press concerning developments in the health programme and the press might be represented on national co-ordinating committees.

Studies and research

There was general agreement that research in the field of health education is of the utmost importance for the success of health programmes. It was pointed out that many programmes fail or are slow in developing because of factors that are still unknown e.g. why people behave as they do, how man thinks of his own environment, the values in which he believes and his aims and ultimate goals.

Some groups also mentioned the need for more adequate estimates of public knowledge on various health subjects as a prerequisite to health education. An example was cited of a study in a highly developed country where it was found that 70% of a sample of schoolchildren aged between 14 and 15 did not know that pulmonary tuberculosis was a communicable disease. It had previously been assumed that this was a well known fact.

The groups also discussed evaluation studies at some length. These include not only appraisal of the effectiveness of programmes but also investigation of the reasons for any lack of success or for failure of people to participate. One group pointed out that to make evaluation possible initial plans should include the collection of baseline data and a clear statement of the problem and goals. One of the members cited an example of continuous programme evaluation as practised in his country. A research team consisting of a public health doctor, a social scientist and a health education specialist moves into an area before the programme begins. They gather all the relevant information on the people, their customs, beliefs, knowledge and practices as standards of reference for the measurement of progress. They live in the area, measuring changes as the programme develops. This combination of research and programme development has proved extremely valuable.

The example was cited of a study to determine why people did not avail themselves of a chest x-ray for detecting tuberculosis although no charge was made. Studies to determine the effectiveness of specific methods

and materials were also mentioned. Such studies would perfect the tools of health education and lead to better results for the same amount of effort.

It was generally felt that the services of cultural anthropologists, psychologists and perhaps sociologists are needed to assist in much of the research work described. It was recognized however that research in the social sciences is expensive and cannot be undertaken in depth without adequate funds. One group suggested approaching university departments of anthropology, psychology or sociology for assistance in research of this type.

One group pointed out that while it is necessary to engage in research of such complexity that it requires social scientists to direct it, there are studies of a less advanced character that can be undertaken by the health workers themselves once they are convinced of their importance. This group suggested that much information useful in programme planning can be gained by intelligent listening to the people rather than by always asking questions.

A warning about undertaking too extensive a study without expert research guidance came from one group which cited the example of a large scale survey on tuberculosis which was undertaken without the help of any social scientists. The result was most disappointing since most of the answers could not be used because the research has not been adequately planned.

The groups were sufficiently concerned about intensifying research in health education to suggest that WHO encourage universities to do more research in the field of health education, prepare a document for the use of Member States setting forth general guiding principles in research and containing suggestions on the types of studies needed, inform Member States of the results of research already done, initiate studies in school health and in the evaluation of public health education programmes, encourage Member States to establish committees on research by making available research consultants (social anthropologists, psychologists and sociologists), providing special grants

and by organizing special seminars on the subject and utilize the International Medical Research and Health Year if approved by the World Health Assembly as an opportunity to carry out research programmes in health education

FINAL PLENARY SESSION

The General Chairman opened the final plenary session by expressing his satisfaction with the useful contributions made by the participants in the group meetings. He invited comments on the draft summary of the eleven group reports.

In the general discussion many of the points in the draft were singled out for special mention. These included the importance of detailed specific yet flexible planning of the educational aspects of any health programme, the important role in health education of doctors, nurses, midwives, social workers, sanitarians, teachers and all others in frequent contact with the public, the need for basic preparation as well as in-service training in health education for all such workers if they are to discharge their role successfully, the progress being made in health education training of medical and paramedical personnel despite the difficulties involved, the need for a great increase in research efforts in health education, the task of WHO in providing leadership in health education research, the value of consulting social scientists and using their research findings in health education programmes.

The role of the health education specialist was reviewed as well as his basic qualifications and training. Although some differences of opinion continued to exist among those who discussed this question, the basic functions as listed in the report of the WHO Expert Committee on Training of Health Personnel in Health Education of the Public² seemed satisfactory.

Tribute was paid to the technical discussions as an excellent means of sharing experiences and experiments in different countries. It was also pointed out that the freedom for exchange of views within the discussion groups had resulted in much mutual education and in fact demonstrated one method of health education.

In a brief statement one of the participants observed that health education was not a programme in the sense that control of a communicable disease was a programme; it was rather a method of public health whereby the knowledge and skill of the physician, engineer, nurse and other health workers could become more readily acceptable to people who could benefit from the services rendered by these workers. The real task of health education was to create an environment in which people could study their problems objectively and find solutions satisfying to them. Over the years through research and experience a body of health education knowledge and skills had been developed which those who engaged in health education should acquire through training. Without such knowledge and skills health workers risked obtaining results quite different from those they intended for; the tool of health education was as dangerous when used by individuals untrained in handling it as was the scalpel when used by an incompetent, poorly trained surgeon.

After expressing appreciation to all those who had contributed to the success of the technical discussions, the General Chairman closed the session by expressing the hope that this meeting was not the end but the starting point for intensified work in all Member States. There was, he said, no end to health education which would continually grow and change as new discoveries were made.

Executive Board twenty fourth session

The WHO Executive Board held its twenty fourth session in Geneva on 1 and 2 June 1959 following the Twelfth World Health Assembly. At the opening meeting Professor E. J. Y. Aujaleu, Directeur general de la Sante publique au Ministere de la Sante publique et de la Population France was elected as Chairman while Professor M. Etemadian (Iran) and Dr H. M. Penido (Brazil) were elected as Vice Chairmen. Dr D. Castillo (Venezuela) and Dr A. J. Metcalfe (Australia) were elected as Rapporteurs.

The Board discussed a preliminary report on BCG vaccination programmes submitted by the Director General in compliance with a resolution passed at the preceding session. The report was in two parts: the first dealing with the degree of protection against tuberculosis obtained by BCG vaccination and the second giving statistical data on WHO/UNICEF assisted programmes for the period 1951-1958. From Part I, which included reviews of the results of controlled trials in the United States and the United Kingdom, it appeared that BCG vaccination could give a considerable degree of protection to properly selected subjects. Part II showed that between 1951 and 1958 WHO and UNICEF assisted the governments of 41 countries and territories with a combined population of 785 million in BCG vaccination campaigns. During these campaigns approximately 234 million persons were tuberculin tested and 88 million vaccinated. The Director General was asked to present a further report on this subject to the next session of the Board.

Concerning the question of an International Health and Medical Research Year which is to be reconvened at the Thirteenth World Health Assembly (see page 9) the Board asked the Director General to obtain suggestions on the subject from Member States and Associate Members, and to ask the regional committees to discuss it at their next sessions and submit any comment or suggestions they might wish to make. A report on the replies and suggestions

received would then be submitted to the Executive Board at its next session.

The Board adopted rules for the international architectural competition to decide on plans for the new Headquarters building in Geneva (see page 294). A jury of seven architects will assist the Director General in choosing the winning design. The first prize will be the award of the contract; the second Sw.fr. 25 000 and the third Sw.fr. 15 000.

The Director-General reported to the Executive Board that as of 1 June total contributions to the Malaria Eradication Special Account (see page 293) amounted to \$8 644 000. The Board requested the Director General to submit a further report on the status of the Account at its twenty fifth session.

The Board decided that the subject of the technical discussions to be held at the Fourteenth World Health Assembly would be Recent advances in tuberculosis control.

The twenty fifth session of the Executive Board will be held at the Palais des Nations, Geneva, commencing on 19 January 1960.

Allergenic potency of dried BCG vaccine

The superiority of dried BCG glutamate vaccine over dried BCG sucrose vaccine has repeatedly been demonstrated by Japanese research workers who have for some time been seeking a BCG vaccine preparation which can be stored for a long period at relatively high temperatures without appreciable loss of allergenic potency.

In a recent article in the *Bulletin of the World Health Organization* Y. Obayashi and his co-workers give further proof of the superiority of the glutamate vaccine based on a study of the degree of post-vaccinal allergy 4 and 17 months after vaccination as determined by tests with Japanese Old Tuberculin (OT) and Danish purified tuberculin (PPD).

After storage for one month at 5 C 30 C 38.5 C and 50 C both types of dried vaccine were administered to schoolchildren. The allergic potency of dried glutamate vaccine stored for a month at more than 30 C was consistently higher than that of dried sucrose vaccine. Only after one month's storage at 50 C did it show any significant decrease in potency.

The mean size of induration with PPD was greater after 12 months than after 4 months. This result was not in accordance with earlier studies which had recorded weaker reactions at the second test. The divergency may be explained by the fact that in the more recent experiments the second injection of tuberculin was given at a different site from the first and injections of tuberculin are known to be weaker in previously used sites than in new sites. It may also be that the second injection had a boosting effect; this possibility is still under study.

Research on drinking water quality

WHO has recently issued a second mimeographed list of investigators engaged in research on drinking water quality containing the names of 136 investigators working on 165 subjects of study in 50 different laboratories or institutions in 34 countries. The first list issued in December 1958 contained the names of 67 investigators.

The compilation of such lists was proposed by a WHO Study Group on International Standards for Drinking Water which met in Geneva in 1956¹ and recommended 28 subjects for research. Part II of the list gives these subjects together with the names of individuals working on research which can be classified under them while Part I gives the names in alphabetical order of all investigators known to be working on water quality research together with their titles and the names of the institutions at which they are working.

It is recognized that many names and items of study have probably been omitted from the list and WHO would therefore appreciate further information from all available sources.

on research into drinking water quality. Since the lists are intended to cover only research in progress omitting the titles of work already published the co-operation of the scientists concerned in keeping this information up to date would be greatly appreciated. Correspondence on the subject may be addressed to the Division of Environmental Sanitation WHO Headquarters Geneva or to the appropriate regional office.

Contamination of foodstuffs

The first WHO/FAO veterinary public health seminar to be held in Asia took place recently. It was attended by veterinarians and other interested public health staff from Australia, China (Taiwan), Fiji, Hong Kong, Japan, the Republic of Korea, the Federation of Malaya, New Zealand, the Philippines and Singapore. Consultants were present from Denmark, Pakistan and the United States of America.

Among the topics discussed by the seminar was that of the radioactive contamination of foodstuffs. Japan is so far the only country in Asia where food is regularly inspected for radioactive contamination with the rapid development and growing use of nuclear energy. Similar inspection programmes may be needed in other countries. Fellowships in radiobiology are accordingly being provided to public health veterinarians by the International Atomic Energy Agency (IAEA), FAO and WHO.

Infections by micro organisms of the *Salmonella* group were discussed to date almost 500 varieties of these organisms have been identified. Salmonellosis is the most frequent type of food poisoning, occurring not only in the developing countries but also to an increasing extent in developed countries such as Australia and New Zealand where almost a third of the population now eat at least one meal a day in canteens, cafeterias and restaurants and the consumption of mass produced ready to serve foods is growing. A recent survey showed that of 200 outbreaks of salmonellosis associated with food 5 came from fresh meat, 87 from processed meat, 41 from eggs (mainly ducks' eggs) and egg products, 23 from cream confectionery, 10 from milk and 34 from other foods. The seminar recommended that cases

¹ For the third recommendation by the Group of Experts on the International Standards for Drinking Water, 1956, WHO, Geneva.

of suspected food poisoning be reported directly to a physician and that public health authorities be equipped to deal immediately with any outbreaks. Other measures suggested were improved national and international methods of reporting outbreaks, health education of persons handling food and the special treatment of certain foodstuffs such as eggs and fish before they reach the consumer.

Travelling seminar on maternal and child health

A group of health administrators, obstetricians, paediatricians and nurses from 24 countries in Europe took part in a WHO-sponsored travelling seminar held in Norway and Poland from 3 to 23 June. The participants spent ten days in each country visiting health centres, maternity hospitals, children's hospitals, day nurseries, schools and institutions for handicapped children. The purpose of the seminar was to study certain general maternal and child health problems existing in the European Region. The discussions, which were based on observations in the two countries visited, dealt mainly with questions of organization and administration, and with the co-ordination of the various maternal and child health services both with one another and with other health services.

Expert Committee on Cancer

Following a recommendation made by the WHO Study Group on Histological Definitions of Cancer Types which met in Oslo in 1957, WHO established an international reference centre for soft tissue tumours at the Armed Forces Institute of Pathology, Washington D.C. towards the end of 1958.

A WHO Expert Committee on Cancer met in Geneva from 2 to 27 June to study the classification and nomenclature of primary tumours of various tissues of mesenchymal origin such as fibrous tissue, muscle tissue, fat tissue, vascular tissue, etc. grouped under the arbitrary designation of soft tissue tumours. The Committee also discussed working principles and a programme for the international reference centre for soft tissue tumours and groups associated with it.

An account of the Committee's work will appear in the *Chronicle* when its report is published.

The prevention of mental ill health

From the opinions expressed at the various meetings and conferences on mental health held by WHO since 1949, it is clear that experts in this field are agreed on the special importance of prevention and in particular of detection of early signs of mental illness and treatment before incapacitating symptoms develop. At the same time the mental hospital has been changing from a custodial institution to one in which patients are treated in freedom, while there is a growing tendency to follow up hospital treatment by out-patient care. Both preventive action and aftercare are increasingly being carried out through the public health services. These developments have given a new direction to the work of public health, social and educational services in many European communities.

A European Conference on Mental Health Practice was held by WHO in conjunction with the Finnish Government from 24 June to 3 July 1959 in Helsinki. It was attended by some 60 representatives of the professions of public health administration, psychiatry, paediatrics, nursing and general medicine from 26 European countries. Its purpose was to discuss modern procedures in preventive mental health work. Specific topics included preventive mental health work with children and the aged, professional training in mental health for nurses and doctors, health education aspects of mental health administration (i.e. the best means of pursuing mental health activities within the framework of existing services).

Milk hygiene

The first report of the Joint FAO/WHO Expert Committee on Milk Hygiene concentrated on the hygiene of fluid milk and recommended that milk products such as butter, cheese and ice-cream should be considered at a later date. The Joint Committee therefore met in Geneva, from 13 to 18 July 1959, to discuss the hygiene of such products particularly in

warm countries The Committee also reviewed recent developments relating to the hygiene of fluid milk including the milk of buffaloes sheep and goats

An account of the Committee's work will appear in the Chronicle when its report is published

Plague in 1958

A note on the incidence of plague in 1958 which appeared in the Chronicle for March

1959¹ gave the number of reported cases in Burma as 18 According to revised data recently published in the WHO *Weekly Epidemiological Record* (No 24 1959) the number of cases in Burma was actually 76 which brings the total number of officially recorded cases of plague in 1958 up to 271 The figure for 1958 nevertheless remains the lowest for any year since the beginning of the century

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People and Places

Medical aspects of industrialization

New industries particularly in the developing countries attract a number of unskilled workers seeking higher wages Very often these workers are quite unaware of occupational risks and are therefore specially in need of health and safety education Moreover the new working populations established round industrial districts in the so called mushroom towns frequently live under great stress and in extremely unhygienic conditions In these circumstances the problems of housing and town planning maternal and child health nutrition mental health control of communicable diseases and the provision of medical care assume particular importance and health authorities often have great difficulty in coping with the responsibilities involved

Professor Richard Schilling has been asked by WHO to prepare a study on the medical aspects of industrialization as the Organization's contribution to a survey on industrialization and productivity now being undertaken by the United Nations Bureau of Economic Affairs Professor Schilling who is Director of the Rockefeller Unit of Occupational Health at the London School of Hygiene and Tropical Medicine has also served as Medical Inspector of Factories in the Ministry of Labour London and as Reader in Occupational Health at Manchester University

Psychiatric aspects of juvenile delinquency

WHO's contribution to the Second International Congress on the Prevention of Crime and the Treatment of Offenders which is to be held by the Economic and Social Council of the United Nations in 1960 will be a paper on

New forms of juvenile delinquency their origin prevention and treatment This paper is being prepared by Dr T C N Gibbens Reader in Forensic Psychiatry at the Institute of Psychiatry of the Maudsley Hospital London England Dr Gibbens who has already assisted WHO on several occasions with the study of problems of crime and the treatment of offenders will travel extensively in Europe and Asia in order to obtain first hand knowledge of current problems of juvenile delinquency in various countries

Sociology and health

Dr Jean Heisler of France has been appointed to advise the WHO Regional Office for Africa on the social cultural and anthropological aspects of its health programmes In this connexion he will plan special surveys of populations in the Region and help to train medical and health workers in social and cultural anthropology

Born in Nantes in 1926 Dr Heisler is a graduate of the Faculty of Medicine of the University

of Paris and has served for two years as sociologist in Dahomey

Tuberculosis control in Malaya

Sir Harry Wunderly former Director of the Division of Tuberculosis Commonwealth Department of Health Australia has been appointed WHO consultant on tuberculosis control in the Federation of Malaya with the task of surveying tuberculosis problems in the Federation and advising the Government on its plans for a control programme. A graduate of the Faculty of Medicine of the University of Melbourne Sir Harry is President of the Association for the Prevention of Tuberculosis in Australia. In January and February of this year he served as consultant in a WHO-sponsored tuberculosis refresher course held in Suva Fiji for assistant medical practitioners in South Pacific island territories

New Area Representative in the Western Pacific Region

A new WHO Area Representative's Office was opened in Taipei Taiwan (China) on 1 July this is the fourth office of its kind in the Western Pacific Region the others being in Sydney Singapore and Saigon. Dr Donald Thomson has been appointed Area Representative in charge of the new office which will cover Hong Kong Japan the Republic of Korea Macau the Pacific Trust Territories of the United States of America and Taiwan (China).

Dr Thomson has served with WHO since January 1947 when he joined the Interim Com-

mission of the Organization as tuberculosis consultant and chief of a mission to Greece. In 1950 he was appointed Tuberculosis Adviser for the Eastern Mediterranean Region and in 1951 he was recalled to Geneva to organize WHO's BCG vaccination programme. He served for several years with the Tuberculosis Section at WHO Headquarters and in 1955-1956 was in charge of the Organization's Tuberculosis Research Office in Copenhagen. Since then he has been WHO Medical Adviser to the UNICEF Asia Regional Office in Bangkok Thailand. Dr Thomson studied medicine at the University of Geneva and carried out post graduate studies at the London School of Hygiene and Tropical Medicine. In 1953 he obtained the Diploma of Public Health of the University of London.

Dr Lawrence O. Roberts has been appointed Area Representative for the South Pacific at the area office in Sydney Australia. The area includes Australia New Zealand Papua and New Guinea Netherlands New Guinea and various island territories. Dr Roberts studied medicine at St Bartholomew's Hospital Medical College London and took a post graduate degree in public health at Harvard University. He has served with WHO since 1950 and before taking up his new appointment was Tuberculosis Adviser to the Regional Office for the Western Pacific in Manila.

As Area Representatives Dr Thomson and Dr Roberts will represent Dr I. C. Fang, Regional Director in the co-ordination of health programmes in their respective areas and in negotiations with governments on technical and administrative matters concerning international health

Education and health

The main object of compulsory education is to ensure that children grow up with enough learning to carry on the ordinary affairs of life and to exercise their duties as citizens. Primary education is enough to meet the minimum requirements and it is essential that health education should be introduced at this stage because an understanding of health needs and activities is part of the equipment of every citizen.

Children who reach the stage of receiving secondary education ought to have a much more elaborate concept of health, derived partly from specific teaching but mainly from practical instruction on through games and other outdoor activities and from more general teaching in such subjects as geography nutrition and the art of living together. At the higher level of education, especially in the training of teachers and other professional workers health instruction should be regarded as one of the required subjects. Every effort should be made to instruct students so that they may become teachers in health.

Review of WHO Publications

Cholera, by R. Pollitzer (with two chapters written in collaboration with W. Burrows and S. Swaroop) Geneva 1959 (*World Health Organization Monograph Series* No. 43) 1019 pages. Price £5 \$20.00 or Sw fr 60.— French edition in preparation.

It would be no exaggeration to say that it was through cholera and the fear to which its pandemic sweeps gave rise that international solidarity in matters of health was born. Cholera was the principal disease covered by the early international sanitary conventions and came at the head of the list of quarantinable diseases. Koch's discovery of the cholera vibrio and thus the confirmation of the contagion theory in 1884 was a scientific keystone of the greatest importance and lay at the base of much progress in the drafting of future sanitary conventions. While in Europe cholera has not been seen since the early twentieth century its endemic foci in Asia remain occasionally erupting into epidemics. The disease continues to claim an annual toll of tens of thousands on that continent and to menace other parts of the world as witnessed by the 1947 epidemic in Egypt from which the disease had been absent since 1919.

Much has been written on cholera in the past hundred years but a great part of the work is scattered among the periodicals of the world and is often not easily accessible. Some of this work has proved to be of

transitory importance, some on the other hand now fallen into neglect, merits inclusion in the history of medical discovery. Today research workers are still at grips with a number of problems among them the immunological characteristics of the vibrio and their implications for cholera vaccine, differential bacteriological and biochemical diagnosis and phage typing and a variety of practical questions of prevention and treatment depending on these.

To assist public health services responsible for cholera control in endemic areas and to provide guidance for those who may one day be faced with the problem in countries now free from the disease the World Health Organization invited Dr R. Pollitzer to prepare a monograph on cholera. The eleven chapters which constitute the main part of this book originally appeared as separate articles in the *Bulletin of the World Health Organization* over a period of three years; they have now been revised and brought up to date in the light of comments received and new information made available during that period.

Dr Pollitzer writes with an authority derived from a long career devoted largely to the fight against cholera and plague. His monograph on the latter disease published by WHO in 1954 is already recognized as a classic; the World Health Organization publishes the present work in the confident hope that it will receive the same acclaim.

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WORLD HEALTH ORGANIZATION

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The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

MALARIA THE CHANGE IN STRATEGY

In 1955 a whole number of the *Chronicle* was devoted to the subject of malaria.¹ It contained sections on the nature and extent of the problem methods of control national and international action against malaria and future prospects and in the last of these sections it looked briefly at the possibility of eradicating malaria throughout the world as opposed to merely keeping it under control by the measures that had been described in earlier sections "Although the general trend in malarious countries today" it went on "is to extend control measures as much as possible the ultimate objective of eliminating malaria as a public health problem from the world calls for a revision of strategy at both the national and international level. On the national plane the more malaria is being controlled the more difficult it will be to ensure credits for the continuation of the work. When control is so successful that only a few cases occur every year it will become increasingly difficult to guarantee the allocation of funds for maintaining the antimalaria campaign at the same level of efficiency as was achieved when malaria was the cause of much illness and economic loss. There are two alternatives continuing year after year the present campaigns until the government stops the credits or perhaps until the local vectors become resistant to the insecticide with serious consequences in either case if malaria has not yet been fully eliminated or concentrating efforts on eliminating malaria within a few years. The latter course is naturally to be preferred though the immediate costs would be greater. However it entails a revision of plans so that malaria control efforts may be co-ordinated control of selected localities be replaced by area control and efficiency of operations and their supervision be intensified. At the international level co-ordination of malaria control programmes between countries is required."

There were no obvious technical or economic reasons—the authors insisted—why malaria should not be eradicated from the Americas Europe Australia and much of Asia within the next 25 years. Tropical Africa offered by no means so promising an outlook and the elimination of malaria from it, or from some Pacific islands and areas of jungle in South East Asia could not be foreseen for the near future. The chief obstacles to eradication were now more social than technical biological or economic. They included the absence of an educated and effective public opinion in favour of eradication lack of sound administrative principles in the practice of public health shortage of trained staff and insufficient international co-ordination. But eradication was a goal that should be striven for since the appearance of resistance to insecticides in vector mosquitos rendered the new control method that had come in since the Second World War of precarious value.

Since 1955 the revision of strategy fore shadowed in the special number of the *Chronicle* has become established fact an all-out effort on an unparalleled scale has been launched to eradicate malaria from the world. The principle of eradication was first adopted by several countries for their own national campaigns then for the Americas as a whole region by a resolution of the XIVth Pan American Sanitary Conference in Santiago Chile in October 1954. As a result of this resolution the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas set up a Co-ordination Office for Malaria Eradication Programmes. Then after a full discussion of the subject the Eighth World Health Assembly adopted a resolution which was a landmark in the history of malaria. The Member States of WHO recognized the crucial situation of malaria control and were prepared to revise radically the policy hitherto

adopted. This historic resolution reads as follows

The Eighth World Health Assembly

Considering that the ultimate goal of malaria control programmes should be the eradication of the disease

I REQUESTS governments to intensify plans of nation wide malaria control so that malaria eradication may be achieved and the regular insecticide spraying campaigns safely terminated before the potential danger of a development of resistance to insecticides in anopheline vector species materializes

2 AUTHORIZES the Director General to request those governments in whose countries malaria still exists to give priority to malaria eradication projects in their requests for assistance under the United Nations Expanded Programme of Technical Assistance and to provide the locally available resources which are required to achieve malaria eradication

11 DECIDES that the World Health Organization should take the initiative provide technical advice and encourage research and co ordination of resources in the implementation of a programme having as its ultimate objective the world wide eradication of malaria

III 1 AUTHORIZES the Director General to obtain financial contributions for malaria eradication from governmental and private sources

2 ESTABLISHES a Malaria Eradication Special Account

The world's most expensive disease

In 1955 when the Chronicle's special number on malaria was published it was calculated that 200 million people suffered and 2 million died annually from malaria. Today there are still some 1100 million people who are exposed to malaria and there is a constant danger of its being accidentally reintroduced into countries from which it has been eradicated. The consequences of malaria are to be reckoned not only in terms of human disease and suffering but also in terms of its economic and social effects. It is still the world's greatest single cause of disablement: it stunts the physical and mental development of the individual: it hampers the

community in its exploitation of natural resources: it reduces agricultural production and it impairs industry and commerce. Its full economic and social effects have never been computed but without doubt it is the world's most expensive disease.

Contrasting concepts

Until a short time ago the control of malaria was all that most countries sought to achieve. The term "control" implied that the disease would not be eradicated but that its prevalence would be reduced to the stage where it was no longer a major public health problem. It followed that there would always be operations against malaria although obviously they would be on a smaller scale as the disease became less prevalent. One method employed was vector eradication: the elimination of all vector species this has been achieved in a number of places by attacking both the larval and adult stages of the mosquito. But the success of this method depends largely on the nature and habits of the species concerned and there is little evidence that it could be used as a means of eradicating malaria throughout the world. The elimination of the malaria parasite however has been shown to be applicable in many countries and in much more widely varying conditions than elimination of the vector: it is this method that has made malaria eradication a practical possibility. When it succeeds in any area the transmission of malaria from mosquito to man has ceased in that area although there may still be vector anophelines: a state which has been aptly termed "anophelism without malaria".

From control to eradication

The problems raised by the change in WHO policy from control to eradication were reviewed in the sixth report of the WHO Expert Committee on Malaria³. Such a change brings as a corollary a series of changes of emphasis in a malaria programme. Where for example in a control programme

the area of operations depends on its accessibility the degree of endemicity of the disease and social political or economic factors in an eradication programme it has to be the entire area where transmission of malaria takes place. Again in a control programme the minimum standard of operations need be no more than enough to reduce transmission to the level where malaria is no longer a major public health problem but in an eradication programme such a standard is insufficient there has to be as near an approach to perfection as can humanly be obtained so that transmission is interrupted in the entire area and new cases should be the subject of exhaustive investigation for the cause must be tracked down and removed or else the eradication programme may be irremediably jeopardized. In an eradication programme therefore the Committee held case finding is of paramount importance. The increased effort required in eradication is amply justified both in terms of the increased expectation of life health and well being of the people and in terms of the social and economic benefits that will accrue. The programme though intensive is relatively brief the money spent may be looked on as a capital investment and not as a perpetually recurring item in the existing state of our knowledge there is every reason to hope that the adaptation of the mosquito to insecticides can be kept at bay long enough to ensure eradication whereas unending successful reliance on insecticides is by no means foreseeable. In producing eradication a government gains an asset in well trained staff of all grades available for other services and it also gains a new approach to the technique of communicable disease prevention which can be a valuable stimulus to similar progress in campaigns against other such diseases.

Eradication of malaria—the Expert Committee emphasized—should be regarded as an emergency measure which falls outside the regular routine of health departments. The planning and organization required should accordingly reach an exceptionally high standard. The cost of eradication is

generally not beyond the financial resources of most countries and in any case considerable sums are available from international sources to provide assistance with the financial side taken care of efficient management at all levels requires the greatest emphasis. It follows that the staff should be well trained and efficient, and to achieve this selection recruitment and training the quick promotion of outstanding workers and the payment of attractive salaries become matters of primary importance. The administration of the programme should be in the hands of someone with sound technical knowledge and administrative experience but in addition a close acquaintance with the country its communications its levels of literacy its social customs and practices and all other relevant aspects is a cardinal point in his qualifications for the task.

A malaria eradication campaign requires the support of the public which can only be obtained by intensive public health education and propaganda. But it should be supplemented by legislation which will vary with the situation within each country and with the legislation already in existence and cover such matters as the right of entry into premises for the spraying of residual insecticides and the compulsory notification of cases of malaria.

A special malaria service will be needed the direction and supervision of the programme being in the hands of the central organization of the service its execution in those of field organizations any variations of this structure or insertion of intermediate organizations would depend on the situation within a country. The central organization should be strong and should include some method of securing co-ordination with other services and of furnishing adequate advice on the technical administrative and social aspects of the programme. Where established scientific organizations and institutes exist the programme should for preference be built round them so as to take advantage of their services where they do not exist provision would have to be made for the scientific studies needed. Both central and field organizations should contain sections

dealing with the two basic aspects of the work: epidemiological (the finding of cases of malaria) and operational (the application of insecticides)

The epidemiological service should first determine the malarious area so that the campaign area can be demarcated. After the detailed ground study the field services should draw up itineraries of work covering the number of houses, methods of transport, estimates of the time required for each job, the type of spraying needed and other relevant information. On the basis of the plans prepared for the whole of the malarious area, approval should be sought for detailed financial estimates embracing not just the first year of the programme but the programme as a whole from beginning to end for an eradication programme is essentially a continuous one and any interruption in it might reverse its progress, not merely postpone its achievement.

A malaria eradication programme as envisaged by the Expert Committee has four phases: preparation, attack, consolidation and maintenance. The preparatory phase will generally have three stages: the initial survey, the preparation of plans and preliminary operations. The survey provides a basis for the planning and the preliminary operations cover the recruitment and training of staff at all levels and the establishment of offices, operation bases, manuals, working procedures and other essentials. Administrative boundaries will be fixed, houses to be sprayed enumerated, itineraries arranged and a transport and supply system organized. A pilot operation of significant size will also be carried out to submit the staff the organization and the planning to the test of practice in the field. This preparatory phase will require several months but should preferably not last more than one year.

The phase of attack will begin as soon as the preparatory phase has ended and continue until transmission of the malaria parasite has ceased. As vivax infections may not die out in less than two and a half to three years, this phase will not normally last for less than that time. During it, periodic assessments of results should be made to

measure what remains to be done rather than what has been done. A surveillance system should also be organized and it might be found practicable to introduce a system of notification of malaria cases and of parasitological verification of fever cases. After about a year of this phase, active case finding should be initiated so that residual and unsuspected foci are quickly discovered and as promptly treated. Throughout this phase it is of the utmost importance that the public and particularly the medical profession should be kept fully informed of progress and urged to co-operate in every way, particularly in case finding.

At the end of the attack phase will begin the phase of consolidation when all residual foci of the disease should be eliminated. Case finding and the administration of anti-malarial drugs will become of prime importance. Spraying will be carried out locally when required and surveillance will be active, intensive and complete.

After three years of consolidation when active surveillance has brought no new indigenous cases to light, the maintenance phase will begin. No special staff will be required, malaria becoming one of the non-endemic diseases for which the regular health department will always be on the look out. Cases will be notifiable and will be treated routinely.

The essence of the phase of attack is the use of residual insecticides, advantage being taken of two characteristics of the mosquito which lay it open to attack: the first being that it does not become infective until the malaria parasite it has ingested with its meal of blood has incubated within it for 10 to 12 or even more days; the second that most anophelines rest on walls of the houses they enter to feed in. The Expert Committee on Malaria discussed the three insecticides in common use, i.e. the chlorinated hydrocarbons DDT, benzene hexachloride (BHC) and dieldrin, their advantages and disadvantages, suitable doses and cycles, the site of their application, formulations and testing methods, the coverage of sprayed surfaces, biological and chemical methods of estimating the amount of insecticide deposited on walls.

so as to ensure that mosquitos landing thereon receive a lethal dose and factors interfering with insecticide activity. All of these subjects raise a series of technical problems ranging from the effect of wear and tear on the nozzle used in the spray pump to the habits of the mosquitos which are to be killed (in India for example it was found that different spraying schedules were required for *Anopheles culicifacies* and *A. fluviatilis*). The different toxic hazards of these insecticides particularly of dieldrin make the question of suitable spraying equipment of much importance.

Larvicidal operations in the Expert Committee's opinion should be restricted to areas where residual spraying is ineffective owing to the habits of the vector mosquito or of man or economically not feasible as in centres of dense population. Drug treatment is an important method of eliminating actual or potential foci of infection after the discontinuance of residual spraying and should also be given to fever cases throughout all stages of an eradication campaign. Mass treatment by drugs cannot be recommended for general practice since it requires very careful supervision and a highly organized system of distribution but it is worthy of small scale strictly experimental trial and would also have a valuable place if residual insecticides failed for any reason to bring about complete interruption of transmission of the disease. One defect that militates against their widespread use is that anti-malarial drugs are excreted relatively rapidly so that they have to be distributed at least once a month. The use of drugs as adjuvants to spraying has however been recommended by the Second African Malaria Conference³ and chemotherapy in this form as well as Pinotti's method of mixing chloroquine with common salt (see page 362) might the Committee thought be of value in some circumstances.

Clearly a country cannot complete its eradication programme if just beyond its boundaries there lies another country where malaria continues to exist uncontrolled. It is essential therefore for countries to co-

ordinate their eradication programmes so that no such situation should be allowed to arise. The frontier zone between countries should be the subject of special measures. Accurate epidemiological information should be exchanged without delay. Tribal movements across frontiers should be restricted to non-malarious months if malaria is seasonal or carefully controlled if not. Pilgrimages and mass gatherings such as the Pilgrimage to Mecca will require co-ordinated efforts. WHO is already playing and should continue to play a considerable part in this work of co-ordinating the measures taken by national administrations by holding regional and inter-regional meetings by establishing channels of communication by arranging regional training courses and by co-ordinating research on current problems.

Looking to the future

By the time the seventh report of the Expert Committee on Malaria⁴ was drafted the malaria eradication campaign was well under way in many parts of the world. Thirteen countries or territories that had once been highly malarious had reached the maintenance phase of their programmes. 24 others were far advanced in the attack phase. In 32 eradication programmes were in the preparatory phase and 23 others were about to plan or start field operations. There remained 56 which had yet to take the first steps towards eradication⁵. In preparing its report the Committee therefore had available the results of much experience on which to base assessments of what had been done and suggestions on what might be done in the future.

The only true measure of the interruption of transmission—the Committee maintained—as the absence of new infections in the population of the area treated. This can be ascertained only by a full epidemiological inquiry into the presence or absence of infection: care should be taken not to draw erroneous conclusions from sampling errors.

¹ 143th Reg. vol. R. P. Ser. 1949 162
² World Health Organization (1949) *Malaria eradication*
³ *A plea for health* 2nd ed. Geneva

natural interruption of transmission or the existence of old infections wrongly deemed to be new. Interruption of transmission and reduction of the number of cases found to zero (or at least to such a level that endemicity cannot readily be re-established) are the criteria for determining when to discontinue spraying but it can be assumed that residual foci of infection will still exist and will eventually be discovered and eliminated. Malaria can be regarded as having been eradicated when there is no evidence of transmission taking place and when no residual foci have been discovered over a period of three consecutive years in at least the last two of which no special mosquito control measures have been taken and no drugs administered routinely.

Malarionetric surveys collecting data in a standardized way are essential in the preparatory and attack phases. In the former they establish a general epidemiological pattern to be used in planning the campaign and provide a base line for future assessments of results. In the latter they furnish information on the effectiveness of spraying operations. They will gradually merge into surveillance surveys as the campaign progresses.

A malarionetric survey will have to be a representative sample of all the villages or other localities in the area and a sufficient number of people will therefore have to be covered. In a homogeneous population of 200 000 for example a number of localities might be selected at random containing say 10% of the total population. Of this some 5000 could be expected to be children aged 2 to 9 but even more children might be examined in view of the significance of infant parasite rates in the early stages of malaria eradication. This group of localities might usefully become an indicator district or index area and serve for periodical assessments of the malaria situation.

Surveillance will be carried out by active detection of cases by the malaria eradication service usually by house to house visits to take blood films by passive detection when the cases come to light by the ordinary processes of notification and by epidemiological and entomological investigation. Except

in areas where passive detection has proved adequate active detection should be carried out universally as soon as possible and certainly throughout the consolidation phase. Passive detection depends to a great extent on the social educational and economic standards of the people and on the availability and co-operation of doctors and others. Its advantage is that properly organized it brings the medical profession into the scheme and with it often some non-medical voluntary workers thus furthering the objectives of public education and public relations. In some countries the methods of passive detection have been elaborated to the stage at which they can form the core of surveillance operations. In the Americas good results have followed the drive to bring the whole community into full participation in the campaign by getting it to report febrile or suspicious cases and fever registers have been instituted here and there. All these activities require the closest supervision so that no genuine case of malaria should go unrecognized and untreated.

Hand in hand with surveillance in the Committee's opinion go experiment and research. The duration of infectivity of the different species of malaria parasite in the human host is one of the factors on which the success of eradication depends as is the number of clinical parasite and particularly infective relapses to be expected in old cases after the start of an attack phase. Something is known about these factors but that there is need for further study is shown by the unexpectedly rapid disappearance of vivax infections in some regions after interruption of transmission. The relationship between parasitaemia and clinical effects also deserves study as it has a bearing on surveillance techniques. There are great differences throughout the world in the proportion of days of asymptomatic parasitaemia and days of parasitaemia with fever and the relative density of gametocytes in the patient's blood in each of these states has not been determined. An assumption that could be investigated during surveillance activities is that under the conditions prevailing in an eradication campaign before complete cessa-

tion of transmission a higher proportion of fever patients than of persons without fever will harbour the parasite the conclusion being that fever cases are of value in indicating infection. In some cases however gametocytes have been found in 20-75% of positive blood smears taken from apparently healthy persons. It is important to know if persons carrying parasites and gametocytes in low density are capable of infecting mosquitos for in the present state of knowledge it appears that only a small percentage of mosquitos biting these "hidden" carriers become infected so that the chance of their survival and the dangers of transmission are small.

Finally field observation should help in the evaluation of the relative effectiveness of notification systematic detection of cases in dispensaries hospitals and the like and active detection of parasitaemia in fever cases.

Generally a specific public health programme affects a limited area and a limited population in a country and does not require to be completed within a certain time. This is not so with a malaria eradication programme so that specially planned educational activities combining health education with public relations methods must be set on foot. An attempt should therefore in the Expert Committee's view be made to enlist the co-operation of the entire population and as many people as possible should be kept fully informed of the objectives and nature of the campaign the social and economic benefits of success and conversely the dismal consequences of failure. Many projects in the Americas have developed a system of voluntary workers and similar arrangements should be encouraged elsewhere. The great value of this system is that it brings the volunteers into direct contact with the field staff they can be made responsible for the distribution of health education material and the transmission of news about coming developments and they can also be used to record cases of fever distribute drugs and if adequately trained take blood smears. Their value is not limited to the malaria eradication campaign they

will also form a basis for the advancement of the general education of the public in health matters as soon as the campaign has attained its objectives.

Not only should the community as a whole be persuaded to co-operate but government and private agencies professional groups and lay persons in as great a number as possible should all be approached and imbued with a sense of responsibility for the success of the campaign. The part that schoolteachers journalists medical and paramedical personnel political leaders and a host of others can and should play in this task of persuasion cannot be over-emphasized.

A number of other problems that had arisen in the eradication campaigns throughout the world were discussed by the Expert Committee. They included eradication techniques in hypoendemic areas the protection of people living in fixed or movable temporary shelters the organization of malaria eradication within the framework of general public health administration in certain countries such as those where malaria is confined to a comparatively short season difficulties in the use of insecticides and the training of epidemiological staff.

The complexity of the problems raised by a world malaria eradication programme is manifest. They are national and international geographical administrative scientific financial educational and social they crop up at every turn and often the solution of one has the effect of raising a variety of others fresh and at times of an unexpected nature. For example the whole theory of eradication is founded upon the tendency of mosquitos to alight after feeding on walls where they pick up a lethal dose of residual insecticide and so die before the malaria parasite has had time to incubate within them. The task of spraying the residual insecticide on the wall, given the numbers of people concerned their habits the inaccessibility of many the suspicion and even hostility with which the campaign may be met the difficulties of finding adequate staff and

transport is in itself of formidable proportions. Moreover the dwellings in some malarious areas have no walls some mosquitos do not alight upon walls but prefer to seek a resting place outside some mosquitos do not bite inside houses but outside some mosquitos are in some way irritated by the presence of the insecticide or avoid it or do not settle on treated walls long enough to

pick up a lethal dose some walls have the property of absorbing insecticide so that its residual action is greatly reduced and finally the greatest problem of all resistance to the insecticides has been found gradually to develop in many anopheline populations.

Some of the problems of a malaria eradication campaign are discussed in the article on page 365

MALARIA ERADICATION THROUGHOUT THE WORLD

African Region

The African Region has an estimated population of about 154 000 000 of whom more than 134 000 000 are exposed to the risk of malaria.

In 1955 the survey of malaria in the Chronicle pointed out that in tropical Africa the situation was not quite so promising [as elsewhere] owing to the current relatively high cost of malaria control in that region and to the absence thus far of any convincing success on a country wide scale. There is no reason to doubt that the difficulties will be overcome but one cannot yet foresee the elimination of malaria from Africa in the near future.¹

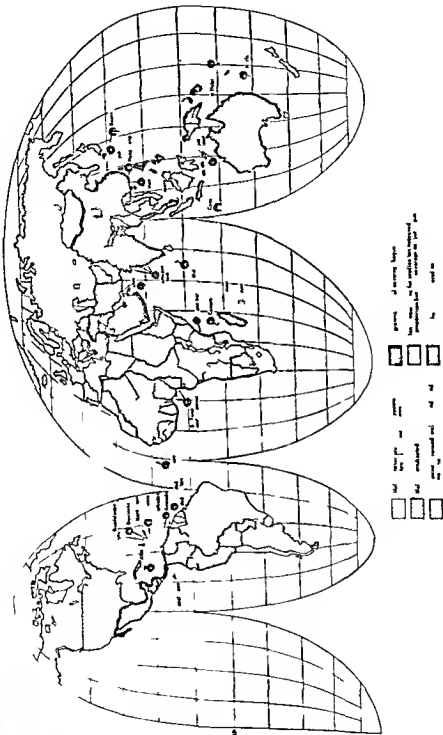
The general prospects of malaria eradication in Africa are now somewhat brighter than in 1955. The results of pilot projects in south east Africa have shown that interruption of transmission can be achieved by residual insecticides alone in this area at the periphery of the distribution of *Anopheles gambiae*. In two other areas (Mauritius and the Yaounde pilot project in the southern Cameroons) the prospect of eradication is so good that surveillance is being tentatively instituted this year.

On the other hand in tropical Africa proper residual insecticides alone have not yet succeeded in bringing about interruption of transmission. The reasons for this may be sought in the epidemiology of malaria in that area the habits of the main vector

A. gambiae the characteristics of the residual insecticides the development of resistance and on the administrative side incomplete coverage of the area the mobility of the population the problem of finance and sociological difficulties.

In holoendemic areas of malaria the indigenous population is subject to severe selection by the disease particularly in the lower age groups this accounts for the high mortality and morbidity rates among infants and children. Investigations carried out in the Belgian Congo the area known until recently as French West Africa and Niamea show that in tropical Africa at least 175 000 children below 15 years of age die every year from the direct effects of malaria. Children who survive to adulthood acquire a considerable but not an absolute tolerance to the malaria parasite and probably suffer from a persistent low grade infection which may still be transmissible through the mosquito.

In some relatively small areas of the high forest (as in the southern Cameroons) the main vector seems to be *A. moucheti* here residual spraying has been a great success. Where *A. funestus* is the only or the principal vector too the results of residual spraying have also been most encouraging although the discovery that *A. funestus* belongs to a species complex the members of which are not easy to identify has rather complicated the situation. The problem is a very much more difficult one with the notorious *A. gambiae* which is responsible for most of the transmission of malaria all over Africa. This



is a hardy long lived mosquito which does not feed on men or shelter inside human habitations as much as earlier observations suggested. It may feed indiscriminately on men or on animals either in the open or indoors and seek natural shelters in holes in trees under banks of earth or among vegetation thus escaping the action of residual insecticides. It ingests large amounts of blood when it feeds so that it is more likely to become infected when the human being on whom it feeds is only slightly infected. Finally there is evidence that *A. gambiae* too really comprises a species complex and that the habits of some strains (and probably their importance as vectors) vary from one area to another. This combination of characteristics makes it the most difficult of mosquitoes to attack effectively.

In October 1955 the first authentic case of resistance of *A. gambiae* to dieldrin was reported. It was soon found that this resistance was extremely marked and also that it was combined with cross resistance to BHC so that where resistance occurred DDT was the only effective weapon available. Resistance of *A. gambiae* to dieldrin and BHC has now appeared on the Ivory Coast and in Liberia the northern Cameroons and Upper Volta. Resistance to BHC has also been recorded in Nigeria. In many other areas however although dieldrin or BHC has been used for three to four years no resistance has been reported. These areas include the southern Cameroons Dahomey Kenya (Nandi) Southern Rhodesia Swaziland Tanganyika (Taveta Pare) Togo and the Transvaal. Nor has any resistance to DDT been so far reported so that in areas of dieldrin resistance DDT is still effective in spite of a certain excitant repellent effect it may exert on *A. gambiae*.

The geographical and ethnological features of rural African areas are such that the spraying of all dwellings and outhouses can be complete only when the organization of the programme is flawless. Delayed supplies shortage of petrol for transport the breakdown of vehicles unusually early and heavy rains or any other such hitches put the whole programme out of gear. The extreme privacy

of the houses of Moslem populations in central Africa must be respected the greatest tact exercised in areas where women are in purdah. In Liberia the crop huts or rice kitchens where people live during the cultivation of their crops are remote from the villages and so extremely difficult to find and to spray. In some areas the inside walls of houses are replastered after spraying or new houses are built between two spraying cycles. Nomads such as the Fulani of Northern Nigeria or those in the Sudan and Somaliland carry with them their huts or their tents which do not lend themselves to spraying. Finally most rural dwellings in Africa are built of mud with thatched roofs. The walls have a potent sorptive action which in the prevailing high environmental temperature rapidly reduces the activity of insecticides. The spraying cycles must therefore be repeated at frequent intervals and the dosage of insecticide must be correspondingly high.

In most African countries there is no national malaria eradication service anti malaria activities being carried out in urban areas by the regular health services. Only in countries where there are pilot projects or eradication has begun is there either a national malaria service or a section in the health services concerned solely with malaria.

In British East Africa the East African Institute of Malaria and Vector borne Diseases at Amani acts in an advisory capacity to the five governments of that area and plans antimalaria activities. In Nigeria the Federal Malaria Service (and the Malaria Unit of the Northern Region) and in French Africa special sections of the Endemic Diseases Service do the same. In Ghana a new malaria unit has been created at the Ministry of Health.

Notification of cases of malaria is compulsory in 7 countries only. Out of the 40 countries in the Region only 12 have any form of malaria legislation.

As a result of the difficulties experienced in organizing a campaign with residual insecticides among which must be included the chronic shortage of staff to carry out operations opinion has swung round to the

view that antimalarial drugs have an important part to play in malaria eradication in Africa. As these drugs are relatively rapidly excreted from the body and must therefore be administered at regular intervals of not less than one month the problem of long term mass administration which arises cannot be solved by the periodic visit of health units. One solution that has been suggested is the organization of a system of distribution of the drugs by village headmen after they have had an intensive public health briefing. Another solution is the administration of medicated salt, the method developed by Pinotti in Brazil (see page 362). Both these methods are being tested.

Technical advice on the programmes is given by the WHO Regional Office. A number of fellowships have been awarded and training courses are held from time to time. Meetings and seminars have been organized in various parts of the Region.

Region of the Americas

Eradication programmes are under way in practically all the malarious areas of the Region of the Americas; these areas contain a population of approximately 85 000 000. The concept of eradication has led to great developments in the public health services: the collection and study of information on the prevalence of malaria has been greatly improved; ingenious procedures for the location and numbering of houses have been devised; a supervisory structure has been created; various administrative and financial adjustments have been made; up-to-date legislation has been enacted. Personnel at all levels have been trained or given refresher courses; operations have been rigidly planned and subjected to a strict chronology.

The programme has sought and obtained the co-operation of the entire community in the countries affected. International collaboration too has been extensive and fruitful; all countries without exception offer the full use of their territorial facilities for observation or training. Brazil, Jamaica and Mexico have joined forces with the long-established School of Malario-

logy in Venezuela to create other international training centres.

Within countries the replacement of the concept of control by that of eradication has reversed a trend towards the merging of malaria control services into the ordinary health services in proportion as malaria became less of a public health problem. National malaria eradication services are now re-emerging as entities and assuming increasing importance in relation to other health services. In nine countries advisory committees or councils have been set up mainly with co-ordinating and advisory functions but in Brazil and Mexico with authority also to take decisions in both technical and administrative questions. Specific units—even departments in some countries—are responsible for health education and public information. Transport and training of vital importance are also looked after by special sections or departments.

Some of the legislation enacted is very advanced. For example in some countries notification of the construction or renovation of buildings and of migratory movements among the population is obligatory. In some authorization must be obtained for painting or washing sprayed walls. In some unsprayed premises may not be occupied. While in most countries or territories cases of malaria must be notified within 7 days in twelve the time limit is 24 hours and in a few the notification must be made immediately. In general authorities, organizations, public and private firms, associations and the population are required to co-operate in the eradication campaign. Thus they do with enthusiasm. Indeed voluntary help is given on a large scale and is very valuable.

There has been an almost complete cessation of anti-larval operations and associated engineering work. Attention is focused on spraying with residual insecticides; over 7500 persons being employed on this work (but over 2000 more are still needed). Spraying squads may be on foot or mounted or may travel by motor boat, canoe or in motor vehicles. The provision of transport and equipment and the organization of the squads to provide total coverage as well as

is a hardly long lived mosquito which does not feed on men or shelter inside human habitations as much as earlier observations suggested. It may feed indiscriminately on men or on animals either in the open or indoors and seek natural shelters in holes in trees under banks of earth or among vegetation thus escaping the action of residual insecticides. It ingests large amounts of blood when it feeds so that it is more likely to become infected when the human being on whom it feeds is only slightly infected. Finally there is evidence that *A. gambiae* too really comprises a species complex and that the habits of some strains (and probably their importance as vectors) vary from one area to another. This combination of characteristics makes it the most difficult of mosquitos to attack effectively.

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ICA UNRWA and the Rockefeller Foundation. Invitations were accepted by various countries of the Region to attend the Ban Lok Malaria Symposium in 1957 and the Third Malaria Conference for South Eastern European Countries in 1958—these conferences were arranged by the South East Asia and European Regions which have common frontiers with the Eastern Mediterranean Region.

European Region

Simple control measures have led to the eradication of malaria in Corsica, Italy and the Netherlands. In other countries the low endemicity achieved has tended to slacken interest in control even to the extent of reducing the budgetary allocation.

The Region has a total population of approximately 657 000 000, the remaining malarious areas of 66 000 000. Malaria has been eradicated in areas with a population of about 270 000 000 and a population of approximately 35 000 000 is under surveillance. Transmission is known to occur in areas with a population of some 3 000 000 for which there is as yet no organized programme of total coverage.

By the end of 1958 Algeria, Morocco and Yugoslavia had agreed to adopt a policy of eradication with WHO assistance. Greece, Portugal, Rumania and Spain had practically achieved full coverage of endemic areas by the beginning of 1958, but their organization was insufficient for effective surveillance so that there was a danger of chronic hypodemecity. They are now reorganizing their services to achieve eradication. Of the 11 countries with indigenous malaria, 8 now have eradication programmes in operation, 4 of them for two years or more.

The malaria eradication service is in no country independent and in only three countries concerned with malaria alone. Some degree of independence is enjoyed peripherally: the field stations and the provincial antimalaria services are in easy and direct contact either with the central organization or with the provincial health services.

In the past Turkey was the one country in the Region which received aid (from WHO and UNICEF) for antimalaria operations, but WHO has now made provision for consultant services to others. A pre-eradication survey team started work recently in Morocco; another is likely to go to Algeria this year. WHO is assisting a training programme in Morocco and has organized courses in various European centres in the last two years: one for malarologists in London, one for entomologists in Amsterdam, one for sanitarians in London and three for laboratory technicians (two in Rome and one in Basle). The malarologist trainees went to Turkey for a field study under a WHO consultant tutor. Finally, a number of fellowships have been awarded.

Co-ordination is obtained by such meetings as the Third Malaria Conference for South Eastern European Countries held in Bucharest in June 1958 and the Malaria Eradication Technical Meeting for South Western Europe held in Lisbon in September 1958. Close co-operation is maintained with neighbouring regions.

South East Asia Region

In the first four decades of the century antimalaria action in the South East Asia Region was confined almost entirely to certain urban areas and communities where there were aggregations of labour either permanent as in tea gardens and rubber estates or temporary as during the construction of engineering works such as railways and dams. With the discovery of DDT, Bombay State and Ceylon took the lead in a programme of large scale rural malaria control with the use of residual insecticides. Ceylon embarked upon a nation wide campaign securing almost total coverage within the next two years. The vastness of India, the multiplicity of autonomous states, the differing degrees of development of the rural health services and the lack of financial resources somewhat retarded progress in that country until financial support by the US International Co-operation Administration (ICA) made it possible for the Government to launch a

the carrying on of epidemiological entomological chemotherapeutic training and publicity operations set formidable administrative problems which are tackled nationally by the malaria eradication services and internationally at three levels by the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas. At the national level a team of international consultants consisting usually of a malariologist (the team leader) an engineering spraying specialist and one or more sanitary inspectors gives day to day operational assistance. At a higher level there is a zone office headed by a person responsible for political and administrative advice which has a technical unit comprised of a highly experienced malariologist a sanitary engineer an entomologist and sometimes consultants in administrative methods and in statistics. This unit supervises the work of project consultants and gives technical assistance at a higher level. Finally there is a central unit at Washington which establishes technical standards supervises and co-ordinates work throughout the region and maintains technical contact with UNICEF, the US International Co-operation Administration (ICA) and the Division of Malaria Eradication at WHO headquarters.

Malaria has already been eradicated in Barbados, Chile, Martinique, Puerto Rico and the USA over an area with a population of some 49 000 000. Elsewhere areas with a population of 4 200 000 have had no indigenous case for a period of three years and yet other areas under surveillance with a population of 1 800 000 have had no cases over a shorter period (in some of these spraying has stopped). Spraying is going on systematically in areas with a population of approximately 46 000 000 irregularly in others with a population of 37 500 000.

Eastern Mediterranean Region

This region comprises 24 countries and territories with a population of about 192 000 000 of whom approximately 145 000 000 live in malarious areas. Until recent years only some 30 000 000, i.e. about 20% of those

exposed to the risk of malaria were protected. Now malaria has been eradicated in Cyprus and in the Gaza Strip. Eradication programmes are in full swing in Iran, Iraq, Israel, Jordan, Lebanon and the United Arab Republic (Province of Syria) and the pre-eradication stage is being approached in Eritrea, Ethiopia, Libya, Pakistan, Saudi Arabia, Somalia (Italian trusteeship), the Sudan, Tunisia and the United Arab Republic (Province of Egypt).

The malaria eradication service is separate in Iran and Jordan but elsewhere it is part of the national health services with a greater or lesser degree of autonomy. Advisory malaria eradication committees exist attended by representatives of WHO, UNICEF and ICA. The structure of the service varies from country to country but as a rule is based upon a spraying unit, an entomological unit and an administrative unit. Legislation is not as advanced as in the Region of the Americas but special legislation on the subject exists in French Somaliland, Iran, Iraq, Israel, Lebanon and the United Arab Republic (Province of Egypt).

Difficulties in the field are caused by the relatively large surfaces *per capita* to be sprayed, the great distances and bad roads between some villages and the nature of the spraying which for epidemiological and climatic reasons must be seasonal. Because of this the work is temporary so that it is difficult to keep experienced workers especially as the spraying season often coincides with the season of agricultural work. As much as a third of working time is used for travel and because communications are poor transport, operational and maintenance costs are heavy.

Co-ordination of the work is achieved by a variety of methods. A regional malaria training centre has been established in Cairo. Sixty WHO fellowships and 9 study tours were provided for malaria workers in 1957 and 1958 so that they might see work in other countries. In December 1957 the first Regional Technical Meeting on Malaria Eradication was held in Baghdad and was attended by representatives from the various countries in the Region and by observers from UNICEF.

needed for harnessing the country's resources to the new task. In 1956 UNICEF agreed to support the first phase of the eradication programme in Burma and in Afghanistan. Thailand had meanwhile gone beyond this phase with the active assistance of ICA. Ceylon which had had an efficient control programme discontinued spraying in 1955 thinking that eradication had been nearly achieved. But the surveillance system proved to be inadequate and there was a recurrence of malaria which made a resumption of the spraying programme necessary. ICA is supplying Ceylon with substantial assistance towards the purchase of insecticides and other requisites for the programme.

In 1958 the Indonesian Government, ICA and WHO discussed plans for a malaria eradication programme and the Government accepted the joint programme which is to be spread over a period of eleven years from 1959. India adopted a malaria eradication plan from 1958 which will convert the existing control programme into one of eradication over a period of three years of intensive attack from 1958 to 1960 with a further three years of consolidation from 1961 to 1963. ICA has agreed to provide insecticides, antimalarial drugs and transport. WHO supplied some of the insecticides for the 1958 programme.

Since 1950 WHO has provided advisory services through the establishment of administrative and training teams in collaboration with governments. At the ninth session of the Regional Committee the WHO Regional Office's provisional eradication plans for each country were adopted in principle. The need for organization has been repeatedly stressed and WHO staff have rendered technical advisory assistance on various levels. Senior technicians including malariologists, entomologists and sanitarians are provided and an experienced malariologist is available as adviser. WHO has also provided special teams to study various aspects of eradication such as the basic factors underlying malaria reproduction in the pre-eradication phase, their evaluation during the attack and consolidation phases and such problems as insecticide resistance. Each country in the

Region has a WHO area representative who keeps the Regional Office and the government concerned in touch. The malaria unit in the Regional Office has been strengthened.

Western Pacific Region

The Western Pacific Region consists of 14 countries and 34 territories with a population of over 840 000 000. Some of these countries have become independent since the Second World War and have encountered various difficulties in adjusting themselves to new social and economic conditions. In several internal political problems have rendered antimalaria operations difficult. Some territories are still underdeveloped and many areas are still unexplored.

Apart from the Australian continent and the five countries on the Asian mainland, all the countries and territories are situated on islands varying in size from the large to the very small. They have a common topography of lowlands, foothills and mountains, the inland and mountainous areas often being accessible only by boat and on foot. In the lowlands endemicity is usually less intense and interruption of transmission more easily obtained than in the hilly and mountainous areas. Temperature and rainfall are such that malaria transmission takes place all the year round except in the most northerly countries such as Korea and Japan.

Many countries and territories introduced antimalarial measures a long time ago—Taiwan in 1901, Malaya in 1911 and others during the 1920's. Control was in many cases limited to urban areas but not exclusively. During the Second World War malaria control was neglected and when it was started again the use of residual insecticides was introduced.

In the past few years most governments have accepted the idea of changing from control to eradication but there are still some which have not yet completed their eradication plans. Serious problems require to be solved such as the shortage of trained staff, insufficient funds and in some areas technical difficulties in interrupting transmis-

national malaria control programme in 1953 In Thailand successful work was done between 1949 and 1951 by the Government and WHO in a hyperendemic area later the country was able to start a scheme of total coverage with the help of ICA In Afghanistan and Burma UNICEF collaborated with the Government and WHO in supplying insecticides transport and other equipment In Indonesia the problem was more complex because of the shortage of trained personnel lack of information on the prevalence of malaria and inadequate financial resources to these technical difficulties were later added such as the development of resistance to insecticides in one of the vector species In spite of these difficulties a malaria eradication plan has been prepared and a beginning will be made this year

Except in Bhutan and the Maldives islands eradication has been accepted as the objective in all parts of the Region Group conferences and seminars have been and are being organized Training institutions such as Malaria Institute of India and those in Indonesia and Thailand are being utilized for the benefit of all the countries in the Region

The total population of the Region is approximately 550 000 000 of whom over 500 000 000 are exposed to the risk of malaria Malaria has been eradicated in only a few very small areas but in other areas with a population of 8 000 000 or so the surveillance phase has been reached and no indigenous cases have been recorded for periods of up to three years Regular spraying has been going on in areas with a population of some 260 000 000 leaving a population of over 230 000 000 still not protected (though India hopes to cover 160 000 000 this year)

In India the chief executive of each state malaria eradication service is responsible to the state director of health services There is provision however for effective coordination of state programmes in the past this was achieved through the director of the Malaria Institute but recently a director of the entire national malaria eradication programme was appointed In all the countries in which malaria eradication is in progress the national malaria eradication

service is a separate one Advisory committees have been set up in the various Indian states and under the Government of India Central organizations exercise much control over the programme in most of the other countries

There has been some disinclination to enact legislation on malaria In Ceylon however legal provision has been made to enforce spraying to permit entry into dwellings and to make environmental sanitation measures obligatory In Thailand the declaration of malarious zones the compulsory spraying of houses the compulsory notification of cases and the requirement that patients provide blood for examination and accept treatment are covered by law In Afghanistan notification of cases is to become compulsory this year

Staffing transport and other problems are met with as in other regions For some countries spraymen and squad chiefs are employed seasonally so that trained staff is difficult to recruit each season Doctors are in short supply as malariologists All kinds of transport are pressed into service and maintenance is a recurring problem Indonesia an archipelago requires a fleet of boats

DDT is the insecticide of choice but in Indonesia and on the Akyab coast of Burma where *A. sundareus* an important vector has developed resistance to it it is replaced by dieldrin A close watch is being kept by entomologists to detect any further examples of resistance

Malaria has always been a major health problem in this region and the concept of malaria eradication came as something new and revolutionary Some countries originally thought that good control measures were a necessary precursor to eradication and that the phasing of operations would need to be staggered over a long period to give them time to harness their personnel and financial resources to the new undertaking However the increasing danger of resistance to insecticides drew attention to the growing urgency of the need for eradication within a reasonable period of time which it was realized should not extend beyond the barest minimum

INSECTICIDE RESISTANCE IN ANOPHELINES

Resistance to the chlorinated hydrocarbons already well known in the case of houseflies was first recorded in culicine mosquitoes in the United States in 1950 and in anopheline mosquitos in Greece in 1951 when *Anopheles sacharovi* was observed to have become resistant to DDT. Cross resistance by this mosquito to chlordane and to BHC was at much the same time demonstrated in the laboratory. Since then other mosquitos have one by one and in increasing numbers been shown to be resistant to one or other of the residual insecticides. The prospect of spreading resistance and of a gradual decline in the destructive power in the residual insecticides and the possibility that before long malaria control would be back at the point where it had been before the introduction of insecticides were the reasons behind WHO's change of strategy from separate malaria control campaigns in different countries to a world wide campaign for the eradication of the disease. The situation resolves itself into a race against time if the cycle of transmission is interrupted before resistance becomes widespread the growing inefficacy of the residual insecticides will not matter if not the prospect is of a resumption by malaria of its position as the world's chief killer.

The sixth report of the WHO Expert Committee on Malaria¹ divided resistance into two types physiological (an increased capacity of the mosquito to survive contact with the insecticide) and behavioural (a change in its behaviour whereby it avoids contact with a lethal dose). Physiological resistance depends on the genetic composition of the original population the biotic potential (the number of generations the reproductive intensity the degree of tolerance of environmental conditions etc.) and the selection pressure. One view of the

mechanism whereby resistance takes place is that in some species of mosquitos genes promoting physiological resistance either are present in some individuals or can be formed by mutation. Exposure of a population containing such individuals to the selection pressure of residual insecticides will lead to a rapid rise in the ratio of resistant genes in the survivors so that resistance in the group will increase. Another view of the mechanism is that the gene of high resistance remains unchanged and is governed by simple Mendelian laws of inheritance involving two paired genes one conveying enhanced resistance the other normal susceptibility. Descendants will thus be susceptible hybrid or highly resistant. Whichever view is correct the result will always be increasing resistance in the mosquito population.

The report discussed the detection and measurement of resistance and the action to be taken when resistance developed. The basis of such action should be the avoidance of anything calculated to increase the selection pressure on the mosquito population. This might be achieved by changing the insecticide reverting to older forms of control such as the use of pyrethrum chemotherapy or larvicidal operations separately or in combination or in some special circumstances perhaps by increasing the dosage improving the formulation or changing the spraying cycle of the original insecticide. This last tentative suggestion was discarded in the seventh report of the Expert Committee on Malaria² since in the meantime research had shown that once resistance had developed to an insecticide it was most unlikely that modification in dosage formulation or spraying cycle would lead to any material reduction in the degree of resistance.

Residual insecticides fall into two groups in relation to resistance resistance that occurs to the group which includes dieldrin

sion owing to the habits of the vectors. Other problems concern the human population and the frequent movement of people between malarious and non malarious areas the building of new houses without notification to the authorities the structure of dwellings (sometimes without walls) and the objections of the public to having their houses sprayed.

Very little information is available about malaria in the mainland of China North Korea the Mongolian People's Republic North Viet Nam and a few small islands but the Mongolian People's Republic appears to be free from malaria as are certain territories east of longitude 170 E. The remaining areas have a population of over 190 000 000 of whom it is estimated that about 45 000 000 live in malarious areas. This includes a population of nearly 1 500 000 living in Singapore which is the only area in the Region which claims to have achieved malaria eradication. Areas with a population of over 13 000 000 have been under surveillance for periods of less than three years without any indigenous cases. Other areas with a population of some 9 000 000 are being regularly sprayed leaving areas with a population of some 20 000 000 where spraying is still irregular.

In Japan the malaria problem has never been serious. Eradication is now very near only 33 cases having been reported in 1957. China (Taiwan) and the Philippines have discontinued spraying in most of their originally malarious areas which are now under surveillance. Taiwan in particular may be the first country in the region to

achieve full eradication. In the Philippines spraying is being continued in certain developing areas where transmission has not been entirely interrupted. Here the spraying of the remote dwellings of new settlers presents a considerable problem. Elsewhere programmes are under way or preliminary plans are being prepared.

Notification of cases of malaria is compulsory in Brunei Hong Kong Japan Malaya the Philippines and Singapore while environmental sanitation measures are obligatory in North Borneo and Hong Kong. Zones may be declared malarious in the Federation of Malaya. As elsewhere there are staffing difficulties and the Philippine Government with WHO and ICA aid is establishing a malaria eradication training centre at the Institute of Malaria Tala Rinal Philippines. Between 1956 and 1958 6 doctors 5 sanitary engineers and an entomologist were awarded WHO fellowships to attend malaria training courses in other countries or to make observation tours.

The Borneo Inter Territorial Malaria Conferences were instituted by the WHO Regional Office in 1956 as twice yearly meetings between malaria experts of the Governments of North Borneo Brunei Indonesia and Sarawak Cambodia Laos Thailand and Viet Nam also in 1956 established an Antimalaria Co-ordination Board which has now been joined by Burma and the Federation of Malaya. A WHO malariologist has been appointed secretary to the Board. About 40 Laotian technicians have been trained or are training at the Malaria Institute Kuala Lumpur.

thus depends to a much higher degree than other antimalarial measures on the human element and this may explain why all attempts in the past to eliminate malaria by this method alone have failed

Because of the difficulties in their administration it was generally held that while antimalarial drugs were of value in the rapid control of epidemics and for the treatment of acute cases they otherwise played only a secondary role. This view began to be revised when the results of residual spraying were found to be disappointing and slow to appear in an unexpected number of cases. Differences in the habits of certain malaria vectors were discovered. Certain species scarcely enter human habitations or do not rest a sufficiently long time on treated walls to pick up a lethal dose of insecticide so that spraying alone is not sufficient to stop transmission¹

Other difficulties arose which interfered with the effectiveness of residual spraying—such as the phenomenon of sorption of the insecticides by mud walls—and special circumstances were found to exist which made residual spraying impracticable as in the case of nomads. These findings have led to a gradual reassessment of the role of antimalarial drugs

The fifth report of the WHO Expert Committee on Malaria recognized that on the evidence hitherto available measures against the mosquito vector must retain priority. The newly synthesized antimalarial drugs could however play an important part in certain circumstances. The behaviour of the local vector or the constant movement of the human population or an influx of infected persons might render the response to mosquito control unsatisfactory and these drugs might be of value in hastening the reduction of the incidence of the disease particularly in circumscribed areas where their distribution and administration could be organized effectively. Again in the final stages of a malaria eradication campaign when transmission had been interrupted relapses or cases coming in from outside

would require radical cure by antimalarial drugs. So too they would be needed for epidemics when mass treatment would be required and in cases where a community lived in conditions which totally precluded the application of anti-mosquito measures.

The Eighth World Health Assembly which was the first to proclaim the policy of malaria eradication had before it a document² suggesting that chemotherapy be used to supplement residual insecticides even in the early stages of spraying campaigns so as to break the cycle of transmission sooner. The view that a combined attack was desirable was also put forward at the Second African Malaria Conference held in Lagos in 1955 under the auspices of the WHO Regional Office for Africa³. A combination of spraying with residual insecticides and mass treatment of the population with antimalarial drugs might well effect a saving in time and in money. A number of pilot projects for the study of the effects of chemotherapy as an adjuvant to spraying were recommended and are now being carried out.

A WHO Malaria Conference for the Eastern Mediterranean and European Regions held in 1956 also stressed the value of chemotherapy which had been emphasized by recent developments as a means of speeding up and consolidating malaria eradication campaigns. Administrative difficulties in distributing drugs to the entire population of a country were however likely to be formidable. Mass chemotherapy was practicable only for communities under strict disciplinary supervision and in an organized campaign against malaria insecticide spraying was the method of choice at least for areas where the vectors did not develop resistance. The main use of antimalarial drugs was in the treatment of individual cases in the last stages of spraying operations and during the surveillance phase when it was of fundamental importance.

This was also the view expressed in the sixth report of the WHO Expert Committee

See WHO Ch. VI 1958 12, 81
Wld Hlth Org. Wkly Rpt 1954 30

1. Publ. h'd workn. document ASP & B 10
WHO Ch. I 1956 10 69
Wld Hlth Org. Wkly Rpt 1957 132

chlordane and BHC might not occur to the group which includes DDT or *vice versa*. If resistance occurs to both groups it might be possible to fall back on the organo phosphorus compounds but as yet not enough is known about their effects and they are toxic and dangerous to use.

The sixth report of the Expert Committee welcomed WHO's interest in research on resistance. The increasing number of cases calls not only for more thorough and extensive field studies but also for fundamental research on the chemistry and genetics of resistance.

By the time the seventh report of the Expert Committee on Malaria appeared genetic studies had proved that resistance to the two different groups of insecticides is of two totally different types. That does not mean that both types could not occur in one place or in one species of mosquito. If they did, no residual insecticide at present available could meet the situation and mass

chemotherapy would need to be instituted without delay. Much research is needed on organo phosphorus compounds or possibly on mixtures of these compounds with chlorinated hydrocarbons. The fact that the two types of resistance appear in an anopheline population as the result of selection in favour of characteristics inherited in a simple monofactorial manner makes it possible that a suitable mixture of insecticides might prevent resistance from occurring.

WHO has introduced standardized methods for testing the susceptibility of adult mosquitoes and larvae to residual insecticides that are easy to use in the field and enable the results obtained in each country to be compared. With them the gradual spread of resistance has been demonstrated in many areas of Africa, the Eastern Mediterranean Region and the Americas. Happily however as yet no species of mosquito that has proved resistant to one group of insecticides has developed resistance to the other.

THE ROLE OF CHEMOTHERAPY IN MALARIA ERADICATION

The success of the residual insecticides against malaria at first rather relegated the use of antimalarial drugs to the background—not surprisingly since the defects of chemotherapy have always lain and still lie not so much in the drugs themselves as in the difficulties of administering them effectively. Not only is a very efficient organization required to distribute the drugs regularly over large rural areas where the population is often widely scattered and sometimes nomadic communications are poor or non-existent and there is no organized rural health service but the constant active co-operation of the whole population is also needed and this is seldom obtainable over prolonged periods. In areas where the population is exposed to infection throughout the year complete elimination of malaria by drugs alone depends on the maintenance of an adequate concentration of the drug in the

blood of each individual. This can be obtained only if sufficiently high doses are taken at regular short intervals by the whole population including young children and infants. If at each distribution even a few people fail to get the drug or do not actually swallow it, a low level of transmission will be maintained and as soon as drug administration is stopped the incidence of malaria will again rise to its initial level. One of the main drawbacks of all known antimalarial drugs is that their excretion tends to be rapid so that it is necessary to administer them repeatedly at relatively short intervals. Experience has shown the difficulty of persuading people who do not feel sick to take drugs at frequent intervals over a long period even in favourable conditions it has seldom been found possible to ensure that more than 80% of the population never miss a dose. Malaria control by means of drugs

free of clinical symptoms may nevertheless be highly infective to mosquitos for some considerable time

The main advantages of chloroquine and related compounds are their rapidity of action which permits short-course or even single-dose treatment their low toxicity and lack of side effects at the prescribed dosages and the absence of evidence that they induce drug resistance

Pyrimethamine has not a sufficiently rapid action on the asexual parasites and is therefore not suitable for treatment of acute malaria infections especially in those who are not immune Its use should be limited to suppression Dose for dose pyrimethamine is the most effective suppressive agent since weekly doses of 25 mg will prevent clinical attacks of all parasite species

The principal value of pyrimethamine in malaria eradication campaigns is its ability to prevent gametocytes of both *P. vivax* and *P. falciparum* from undergoing full development in the mosquito so that mosquitos feeding on patients taking pyrimethamine do not develop sporozoites and thus are unable to transmit the disease

The most important drawback of this drug is its tendency to stimulate the appearance of resistant strains of parasites particularly when it is used indiscriminately for therapeutic purposes

The 8-aminoquinolines e.g. *primaquine* and *primaquine* have two important defects the narrow margin of safety between therapeutic and toxic doses and their failure to affect the asexual parasites of *P. falciparum* They are however relatively effective against those of *P. vivax* and *P. malariae*

The chief importance of this group lies in the fact that they are the only known drugs that destroy the persistent exo-erythrocyte parasites in the liver which are responsible for relapses of vivax and malariae infections Their principal application is thus in the radical cure of these infections The standard treatment consists of a 3-day course of chloroquine followed by a dose of 15 mg of primaquine daily for 14 days Treatment with 8 aminoquinolines should not be given except under medical supervision because owing to

the toxicity and the cumulative effect of these drugs unpredictable side effects may occur during treatment especially in dark skinned races

Drugs belonging to the 8 aminoquinoline group are also active against the gametocytes of all species of the human malaria parasite Doses of 15 to 30 mg of primaquine render falciparum gametocytes non infective to mosquitos within 24 hours and eliminate them from the blood stream in 2-6 days But as these drugs are rather quickly metabolized and eliminated and are too toxic for prolonged routine administration at short intervals it seems that little practical use can be made of this property

Standard drug treatment in malaria eradication programmes

The most effective and most often used drugs for single-dose treatment are chloroquine or amodiaquine the adult dosage in each case being 600 mg of the base These drugs however do not affect *P. falciparum* gametocytes and will thus not prevent transmission of the disease

It is therefore advisable to add a sporontocidal drug such as pyrimethamine which has the effect of rendering gametocytes non infective to mosquitos A single-dose treatment consisting of 600 mg chloroquine base + 50 mg pyrimethamine has been recommended Administration is facilitated by combined tablets (each containing 200 mg chloroquine base + 16.5 mg pyrimethamine) which have now become available as a result of a suggestion by WHO They have the advantage of reducing the number of tablets to be distributed

Radical cure is relatively easy in the case of falciparum infections the standard treatment being a 3-day course of chloroquine (900 mg of the base on the first and 300 mg on the second and third days) or of amodiaquine In semi immune subjects even a single dose of a 4-aminoquinoline will often result in radical cure

With vivax and malariae infections on the other hand treatment aiming at radical cure

on Malaria ⁶ Drug treatment should be used for fever cases in all stages of an eradication campaign the cure of a high proportion of cases in the early stages greatly facilitating later operations Mass treatment could not be recommended for general use on the basis of existing knowledge but deserved to be tried out on a small strictly experimental scale It might however be necessary if spraying failed for any reason to break the cycle of transmission completely

The seventh report of the WHO Expert Committee on Malaria referred to chemo-therapy as an essential part of malaria eradication programmes especially in the later stage ⁷ Thus although spraying with residual insecticides remains the fundamental measure in all eradication programmes it is now generally accepted that antimalarial drugs may usefully be employed as a supplementary measure their chief value being in the later phases of the campaign to ensure complete elimination of all residual foci Regular mass treatment of an entire population can seldom be carried out efficiently and is therefore not recommended except where because of local conditions residual spraying is not feasible or has proved ineffective In this case there is a definite need for a drug with a long lasting effect which can be administered by a single dose at widely spaced intervals

Types of antimalarial drugs

According to the sixth report of the WHO Expert Committee on Malaria the ideal antimalarial should combine the virtues of causal prophylaxis suppression rapid and complete curative action sporontocidal effect and inability to create parasite resistance together with low toxicity very slow excretion palatability and low cost ⁸

As yet no drug has been discovered which combines all these qualities nor would one appear to be in sight Research is in progress however

All antimalarial drugs at present available have certain limitations and are to some extent selective in their action depending on the parasite species and on the developmental phase of the parasite Their activity also varies with parasite strains of different geographical origin and is affected by the degree of immunity of the patient However by combining different drugs complete suppression as well as radical cure of all malaria infections is now possible

Apart from quinine a great variety of synthetic antimalarial drugs are at present in use ⁹ They may be classified broadly into the following five groups

- (1) Amino acidines m paeine
- (2) Biguanides proguanil
- (3) Diaminopyrimidines pyrimethamine
- (4) 4 aminoquinolines chloroquine amodiaquine sontoquine
- (5) 8 aminoquinolines pamaquine pen-taquine primaquine and the Russian quinocide

Drugs belonging to the last three groups are those most often employed in malaria eradication programmes

The 4 aminoquinolines especially chloroquine and amodiaquine are the most useful drugs for the treatment of acute malaria They will rapidly eliminate the asexual blood forms of all species of malaria parasites and bring about the disappearance of clinical symptoms They are also very effective for suppression weekly doses of 300 mg of the base giving protection against all species of human malaria But no compound belonging to the group affects the primary or secondary tissue phase of the parasites They will therefore not prevent either infection or relapses Only falciparum infections in which there are no persistent tissue forms can be radically cured by drugs of the 4 aminoquinoline group

A further limitation of this group is its failure to affect the gametocytes of *Plasmodium falciparum* so that patients treated with chloroquine or related compounds and

Wld Hlth Org t hn R p Se 1957 123
Wld Hlth Org t hn R p S 1959 162, 22
Wld Hlth Org t chn Rep S 1957 123 45

Detailed information on the trial of drugs their action dosage and ex will be f 81 Cavell O t al (1955) Chemotherapy of malaria (Wld Hlth Org t Hlth Mon t ph Ser n 27) Geneva.

24 mg of chloroquine base. To make sure that only medicated salt was used all salt stocks were replaced by medicated salt anyone without salt was supplied with the medicated form an agreement was made with wholesalers that no more ordinary salt should be sold and a careful check was made periodically to ensure that only chloroquinized salt in the right proportions was in use even in the small industries which salted meat and fish for local consumption. Blood tests of the population were also carried out frequently to check the chloroquine level.

The first trials were carried out in the states of Para and Maranhão. In Para where the vector mosquito was *A. darlingi* the trial area had a population of 900 a control area one of 400. In June 1952 before the chloroquinized salt was introduced the parasite rate in the trial area was 8.5% in the control area 6.9%. 40 days after the introduction of the salt the parasite rate in the trial zone was 0.6% this being due to two falciparum infections one of a baby at the breast the other of a group-up who had been living in the area for only three days. In a fresh trial made in November 1952 the parasite rate of the treated area was 0% of the control area 3.7%. In January and May 1953 the parasite rates of the treated area were 0% and 0.2% (a vivax infection of another baby at the breast) of the control area 6.1% and 25.4%.

In Maranhão where transmission is brought about by *A. tarsimaculatus* (*A. aqua salis*) the trial area had a population of 147 the neighbouring control area one of 163. Before the introduction of the chloroquinized salt the parasite rate in the trial area was 9.8% in the control area 10.4%. 30 to 40 days after the salt was introduced it was 1% in the trial area 13.2% in the control area.

Later field trials¹ confirmed the results obtained. Hospital trials were also conducted over a period of 2½ years both to confirm the findings in the field and to determine the suitability of the amount of chloroquine

added. Observations were made on the therapeutic and suppressive action of the chloroquinized salt which was given in daily doses of 45 mg, 30 mg, 20 mg and 10 mg of chloroquine base. Some of the patients had been naturally infected with *Plasmodium vivax*, *P. malariae* and *P. falciparum* and a group were inoculated with blood containing *P. malariae* or *P. vivax* the total number of patients treated with each dosage being 32, 20, 16 and 2 respectively. The first three dosages were sufficient to control fever and to eliminate the parasites from the blood the fourth was not. Relapses observed only in a few patients submitted to short intermittent periods of treatment to ascertain the time needed to cure the disease with the different dosages used were rapidly controlled by resumption of treatment. Observations were also made on the toxicity of the drug in 5 patients who were treated daily for a period of two years and on the chloroquine concentration in the blood.

Of particular interest was the ability of chloroquinized salt to suppress malaria in subjects inoculated intravenously with blood infected with *P. vivax* or *P. malariae*. A daily dose of 45 mg of chloroquine base was given to 29 subjects so inoculated. None contracted infection during the observation period of 5 to 22 months whereas 20 controls inoculated in this way all developed malaria. A daily dose of 30 mg was given to 8 subjects inoculated with *P. malariae*. None contracted the infection during a period of eight months in which they were under observation but the 5 controls all did. Finally a daily dose of 20 mg of chloroquine base was given to 12 subjects inoculated with *P. malariae* they did not develop malaria but the 6 controls did.

In these experiments the administration of medicated salt was started as a rule one week before inoculation but of the patients on 20 mg daily 6 started medication on the day of inoculation. Medicated salt was given for periods varying from a minimum of a few days to a maximum of two years. The general conclusion reached was that 30 mg of chloroquine base daily provided a suitable dose.

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Research into antimalarial drugs

In addition to drug trials in the field WHO has stimulated and supported a series of research programmes on the action of anti-

malarial drugs which are of direct interest in malaria eradication programmes.

Of particular value are the so-called sporontocidal drugs which when given in a single dose rapidly render gametocyte carriers non-infective to mosquitoes. As the available data on this effect are still very inadequate WHO has provided grants to institutes in several countries to assess the sporontocidal action of pyrimethamine and of primaquine in filiparum and vivax infections and to determine the maximum duration of this action after the administration of small single doses. These investigations which have already yielded interesting results are still going on.

III. PINOTII METHOD

The malaria eradication campaign in the centre and west of Brazil is handicapped by the enormous area to be covered, the great forests and the inaccessibility of the people in the Amazon Basin. In some areas the houses have no wall, the roof being supported by posts and mosquitoes enter freely on their prey settling on it. One of the principal vectors on the central plateau *Anopheles darlingi* bites out of doors attacking both animals and men. In many parts of the country there are very few people and those there are often either nomads or migrants who shift their homes and villages from time to time for the purposes of cultivation. In a stretch of country like this the elimination of transmission by residual infections may be doomed to failure from the start. It was estimated that before the Pinotti method was introduced three million people were unprotected because they could not be treated.

Key elements of the difficulties of this situation Dr M. Pinotti of Brazil conceived the idea of adding an antimalarial drug to common salt on the basis of the residue added to salt in areas of endemicity. Once a suitable method could be found the distribu-

tion would be easy for practically the whole of the malarious area of Brazil was entered by a network of services for the free distribution of certain medicines.

Chloroquine was the drug of choice for it is resistant to heat for three to four hours between pH 4 and pH 7 and so has excellent chemical stability. The daily dose to be incorporated in the salt was first fixed at 45 mg on the ground that prophylaxis was usually assured by a weekly dosage of 100 mg of chloroquine diphosphate base (i.e. a daily dose of 45 mg). The mixture was first prepared by drying kitchen salt at a low temperature in special receptacles adding chloroquine diphosphate dissolved in distilled water, mixing the two and stirring the mixture in bags. This method has now replaced by the more reliable one of mixing powdered chloroquine with the salt in a mechanical mixer.

Ten grams of chloroquinized salt prepared in this way contain approximately 50 mg of chloroquine diphosphate (30 mg of the base). As the daily salt consumption of an adult in normal circumstances is between 10 and 15 g and of a child under 12 between 5 and 8 g adults would in theory receive daily from 50 to 45 mg children from 15 to

24 mg of chloroquine base. To make sure that only medicated salt was used all salt stocks were replaced by medicated salt anyone without salt was supplied with the medicated form an agreement was made with wholesalers that no more ordinary salt should be sold and a careful check was made periodically to ensure that only chloroquinized salt in the right proportions was in use even in the small industries which salted meat and fish for local consumption. Blood tests of the population were also carried out frequently to check the chloroquine level.

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Of particular value are the so-called "sporontocidal" drugs which when given in a single dose rapidly render gametocyte carriers non-infective to mosquitos. As the available data on this effect are still inadequate WHO has provided grants to institutes in several countries to assess the sporontocidal action of pyrimethamin and of primaquine in falciparum and vivax infections and to determine the minimum duration of this action after the administration of small single doses. These investigations which have already yielded interesting results are still going on.

THE PINOTTI METHOD

The malaria eradication campaign in the centre and west of Brazil is handicapped by the enormous area to be covered, the great forests and the inaccessibility of the people in the Amazon Basin. In some areas the houses have no walls, the roofs being supported by posts and mosquitos after feeding on their prey settle outside. One of the principal vectors on the central plateau *Anopheles darlingi* bites out of doors attacking both animals and men. In many parts of the country there are very few people and those there are often either nomads or migrants who shift their homes and villages from time to time for the purposes of cultivation. In a stretch of country like this the elimination of transmission by residual insecticides may be doomed to failure from the start. It was estimated that before the Pinotti method was introduced three million people were unprotected because they could not be got at.

Recognizing the difficulties of this situation Dr M. Pinotti of Brazil conceived the idea of adding an antimalarial drug to common salt on the analogy of the iodine added to salt in areas of endemic goitre. Once a feasible method could be found the distribu-

tion would be easy for practically the whole of the malarious area of Brazil was covered by a network of services for the free distribution of certain medicines.

Chloroquine was the drug of choice for it is resistant to heat for three to four hours between pH 4 and pH 7 and so has sufficient chemical stability. The daily dose to be incorporated in the salt was first fixed at 45 mg on the ground that prophylaxis was usually assured by a weekly dosage of 300 mg of chloroquine diphosphate base i.e. a daily dose of 43 mg. The mixture was first prepared by drying kitchen salt at a low temperature in special receptacles, adding chloroquine diphosphate dissolved in distilled water, mixing the two and stirring the mixture in trays. This method has now replaced by the more reliable one of mixing powdered chloroquine with the salt in a concrete mixer.

Ten grams of chloroquinized salt prepared in this way contain approximately 40 mg of chloroquine diphosphate (30 mg of the base). As the daily salt consumption of an adult in normal circumstances is between 10 and 15 g and of a child under 12 between 5 and 8 g adults would in theory receive daily from 30 to 45 mg children from 15 to

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A programme for the eradication of malaria cannot be drawn up in a country without a great deal of preliminary spadework. This is so even when an efficient malaria control scheme is in operation where there is no malaria control scheme or only a small one the preparation of an eradication programme is correspondingly more difficult. The programme in Iraq may be taken as an illustration of the complexity of the task.

There are nearly 4 million people in Iraq who are exposed to infection from malaria. In 1947 a control programme was started by the Government in some urban areas. In 1950 a WHO engineer was sent at the Government's request to assist in operations against an impending outbreak of malaria after floods. In 1952 WHO and the Government signed an agreement on control and the programme which had started in 1947 was expanded to include a demonstration area. Further spraying was carried out in 1953 and in 1954 operations were extended with WHO and UNICEF assistance to cover the whole country. In 1955 a WHO malaria consultant and the WHO malaria adviser for the Eastern Mediterranean Region visited Iraq and recommended to the Government that eradication not control of malaria be made the goal of its efforts in accordance with the Eighth World Health Assembly's resolution on the subject (see page 342).

In 1957 the Government of Iraq, WHO and UNICEF signed an agreement for a five year plan of operations for a malaria eradication programme in Iraq. The objectives of the plan were first, the eradication of malaria by residual spraying and other control measures to be continued until transmission had been interrupted for three consecutive years (and when that was done the implementation of measures to prevent re-infection) second the establishment of a malaria eradication department to take full charge of the programme and third the creation of

a regional malaria training centre which would follow WHO policy in training malariologists entomologists sanitarians and technicians to meet national requirements and also train candidates from neighbouring countries.

To carry out this important and expensive national programme the malaria eradication department was to have its own budget administered by a representative malaria eradication board acting on behalf of the Ministry of Health and presided over by the Minister of Health. The Board was to include representatives from the Ministries of Finance Development and Agriculture one from the Army Medical Corps and a prominent medical man and was to meet twice a year to review and approve the general programme which would be submitted by the Director General of Endemic Diseases. Execution of this programme would be the responsibility of the Director General and he would have power to request local administrative and health authorities to collaborate. The programme would consist of detailed plans of operation for each of the districts into which the country is divided, prepared by the malaria eradication department in collaboration with the WHO malaria team. The WHO malariologist would act as senior adviser to the project and contribute to the planning and to the evaluation of results. Other members of the WHO staff would assist in the eradication and training programmes.

Under the malaria eradication department there would be 3 regional centres and 14 sector offices each with a staff comprising a sector chief a sanitary assistant clerks a storekeeper labourers a pump repairer and a guard and under the sector officers would be the spraying teams each comprising a team leader (a malaria inspector) and 5 spraying squads. The agreement provided for 380 squads throughout the country each

Chloroquinized salt has been used successfully in the north of Brazil which has a high temperature and is very humid in the south which has a high humidity but a lower temperature and in the centre which has a high temperature but a relatively lower humidity. The mixture thus appears to retain its efficacy in the field in varying conditions of temperature and humidity though it has been reported that it keeps well only if the relative humidity is less than 80% leaching occurring with loss of uniformity if the humidity rises above this level. Service centres have been set up in Brazil as a rule near salt warehouses or distributors with an official in charge to look after the incoming chloroquine and the preparation and distribution of the mixture. The equipment for the preparation of the mixture is simple the process of preparation itself equally so. Salt can be tested for the presence of chloroquine by an easy iodine test and urine analysed to make sure that chloroquinized salt is being consumed.

Chloroquinized salt has been used in Brazil in other circumstances where spraying has failed. In the small island of São Francisco lying off the coast DDT spraying had been effective in the inland plateau but not on the coastal plains where bromeliad growths abound. Bromeliads are large plants shaped like pineapple tops that grow on the trunks and branches of certain trees and hold a great deal of water which provides mosquitos with an ideal breeding place. The malarial staff tried to kill off the bromeliads by toxic sprays which however destroyed other vegetation as well by manual removal or by felling the trees and replacing them with eucalyptus all laborious expensive and not very successful methods. The results of using chloroquinized salt in this island have so far been good.

In view of Pinotti's favourable results and their possible implications for the world malaria eradication programme WHO requested a group of research workers in

the United States to evaluate chloroquine and pyrimethamine in a drug salt mixture under control conditions using volunteers as test subjects.² Investigation showed that neither those preparing the food in which the mixture was used nor the test subjects noticed any difference in taste or appearance between ordinary salt and medicated salt. Chloroquine is bitter however unlike pyrimethamine and if its concentration were greater than the amount used—which was sufficient to give a weekly dose of 300 mg base—the taste would become noticeable and the acceptability of the salt decrease. The mixtures were stable under all conditions normally encountered in the preparation of food or in transport and storage. The effectiveness of a medicated salt obviously depends on adjustment of the concentration of the drug to the consumption of the salt and the test subjects judging from their urinary chlorid excretion varied considerably in their salt consumption. Nevertheless even those who consumed small amounts of salt only with commensurate amounts of drug showed complete suppression of malaria and those who consumed large amounts of salt showed no signs of toxicity. Although the test subjects were subjected to the bites of mosquitos infected with *P. vivax* on several occasions suppression was complete not only while they were on the medicated salt but for 28-40 days afterwards. Controls not only became infected but exhibited parasitaemia for 13-15 days after exposure. The weekly dosage either 300 mg chloroquine base or 25 mg pyrimethamine was adjusted to the average weekly salt consumption which was found to be 50 g.

Medicated salt would thus appear to have a useful part to play in circumstances where other methods of malaria eradication encounter difficulties. WHO is planning to assist several governments to prepare and distribute it in suitable areas on an experimental basis.

Dr. WILLIAM A. OTT, D. Sc., D. Ph., D. Sc.

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The spraying campaign each year would last for 60 days beginning at different times in the north centre and south of the country and ending just before the beginning of the transmission season Spraying would also be carried out in special areas where the people moved to summer huts Larvicidal operations and treatment by drugs were not excluded but were reserved for special cases The agreement laid down a detailed time schedule for spraying operations as from January 1957 on In 1959 1960 and 1961 spraying in areas sprayed since 1954 1955 and 1956 respectively would be discontinued where recommended discontinuation depending on malanometric investigations and following criteria to be established by WHO Epidemiological findings might modify the targets if so the schedule might also be modified subject to the approval of the malaria eradication board

The epidemiological section of the malaria eradication department was to be strengthened to carry out investigations before and after spraying of all the communities to be covered by the eradication programme Fourteen epidemiological and entomological teams were organized in 1956 under the supervision of the three regional malaria eradication centres to perform malanometric and entomological surveys which would provide data for the evaluation of the programme and for the decision when to discontinue spraying The malaria eradication department was to organize a service in all districts to detect and treat all cases of malaria whether indigenous or imported For that purpose malaria was to be made a notifiable disease The various malaria eradication centres would be responsible for confirmation by microscopy of all cases reported as well as for their treatment and epidemiological investigation

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For at least the first two years of the programme WHO would subject to the availability of funds provide a malariologist, an entomologist a sanitarian and a laboratory technician and the WHO regional sanitary engineer would help in the training programme and in the co-ordination of eradication measures along the frontiers Subject to the same proviso it would also grant two fellowships in 1959 one for a malaria officer to specialize in public health and tropical medicine the other for an engineer to specialize in sanitary engineering It would invite the Director-General of Endemic Diseases to attend conferences for the co-ordination of the programme with those of neighbouring countries

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This programme established with such care and detail met with a setback shortly afterwards in the form of the development of resistance to DDT by *Anopheles stephensi* in southern Iraq In 1958 an addendum was accordingly made to the agreement whereby

WHO was to supply staff for the investigation of this resistance. Two WHO technicians would work in an experimental station to be set up in southern Iraq and a WHO entomologist would co-ordinate the station's activities with those of other stations in the *A. stephensi* area in a neighbouring country. The WHO team would work in close collaboration with the malaria eradication department under the supervision of the senior WHO malaria adviser. WHO would also provide a malariaologist for six months to assist the senior WHO malaria adviser particularly in the evaluation of operations, the planning of programmes dealing with epidemiological investigations and other special problems and the training of national staff. The Government of Iraq would provide facilities for this staff. WHO also agreed to provide two inter regional fellowships to enable professional staff of the malaria eradication department to study abroad.

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Inevitably a malaria eradication programme of such proportions will involve a great deal of expenditure but as the WHO pamphlet entitled *Malaria Eradication A Plea for Health* says "The capital invested in eradication programmes will be regained in a few years and once eradication is achieved the world community as a whole richer and poorer members will benefit".

MALARIA IN THE USSR

During the nineteenth century and the early part of the twentieth malaria was one of the main endemic diseases in Russia occurring throughout the country but being particularly prevalent in the Caucasus in Transcaucasia in Central Asia and along the lower Volga. The annual mortality in the garrisons stationed during the latter part of the nineteenth century along the northern shore of the Black Sea and near the Persian frontier amounted to as much as 25%. It was estimated that 5 000 000 people were affected annually in the years 1890-1900 and at least 3 500 000 during the First World War. In the wake of that war the huge movements of population that took place

and the general lowering of economic and social standards led to the greatest malaria epidemic of modern times in Europe which ravaged a large part of the USSR in 1922-1923. There were 600 000 fatal cases of malaria in each year and in parts of Central Asia the Caucasus and the Volga basin 75 100% of the population were infected. One report claimed that not less than 12 000 000 cases were involved.

In the early twenties an Institute of Protozoology and Chemotherapy (now the Institute of Malaria Medical Parasitology and Helminthology) was set up in Moscow and rural antimalaria stations were created in growing numbers. By 1930 the situation had improved public health measures in general and malaria control in particular were more widely undertaken and better

Planned by the Division of Malaria and Mosquito Control, WHO, Geneva, 1950. Published by the WHO, Geneva, 1950.

having a squad leader 8 sprayers 2 foremen and 4 labourers (a mixer porters and a painter). The basis adopted was of one team per 50 000 or so population to be protected. Transport was to be provided for the teams including two marsh boats for the area around Basra and Amara and DDT was to be sprayed at the rate of 2 g of pure technical DDT per m².

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Condensed from article by Dr L. J. Bruce-Chwatt, Chief, Plans & Division of Malaria Eradication, WHO, first published in the *Journal of the Royal Society of Medicine*, 1954, 47, 1-10.

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executed and institutes of tropical medicine had been established in a number of places. Apart from 1934-1936 when there was a temporary increase especially in Central Asia and the Caucasus the morbidity rate for malaria fell gradually year by year until in 1939 it was the lowest that had ever been recorded in the USSR. The Second World War caused a temporary setback there was almost inevitably a great increase in the number of cases in the devastated areas particularly in the Ukraine and Byelorussia.

In the post war years public health services were reorganized and malaria control tightened up. The morbidity decreased from 222 per 10 000 in 1940 to 39 per 10 000 in 1950. In 1951 a national antimalaria programme was included in the Five Year Plan with striking results whereas in 1952 the number of cases of malaria in the USSR had been 183 603 in 1958 it was 4678. In 1952 the concept of elimination of malaria as a mass disease was adopted and by 1955 it had become obvious that total eradication could be achieved by 1960.

Research organizations and publications on malaria

The principal malaria research institute is the Ministry of Health Institute of Malaria Medical Parasitology and Helminthology but there are eleven other research institutes of health or tropical medicine throughout the country as well as many others doing work connected with malaria. Research on medical entomology is carried out at the Institute of Zoology of the USSR Academy of Science and at various other places.

Most papers on malaria appear in the journal *Meditsinskaya Parazitologiya i Parasitarnye Bolezni* (Medical Parasitology and Parasitic Diseases) which is published in Moscow every other month. It often publishes comprehensive reviews of recent work done outside the Soviet Union on specific problems. Papers on malaria vectors are usually published in either *Entomologicheskiye obozreniya* (Entomological Review) or *Zoologicheskii zhurnal* (Zoological Journal) and those on insecticides mainly but not

exclusively in *Gigiena i sanitariya* (Hygiene and Sanitary Engineering) they may also appear in *Farmakologiya i toksikologiya* (Pharmacology and Toxicology) *Voenno-meditsinskii zhurnal* (Journal of Military Medicine) or *Zhurnal mikrobiologii, epidemiologii i immunologii* (Journal of Microbiology, Epidemiology and Immunology).

Parasitology and epidemiology

Plasmodium falciparum has been recorded mainly in Central Asia, Transcaucasia, the south of the Ukraine and along the lower Volga. Small foci have also been found in Central Russia and sporadic cases of *falciparum* malaria have even been recorded occasionally in North Russia as far north as Archangel. Quartan malaria has been found in some regions of the Azerbaijan republic on the shores of the Black Sea and in the Volga delta. *Vivax* malaria used to occur in all the remaining malarious areas of the USSR. Two sub-species of *P. vivax* were distinguished: the southern *P. vivax vivax* with a short incubation period of 14-20 days and the northern *P. vivax hibernans* with a long incubation period of several months.

In the northern and central parts of the Soviet Union vectors infected before hibernation die out before they become infective in the spring. The principal part is played by the first generation of mosquitoes after hibernation which takes its first flight in May or June and is usually the only one responsible for the transmission of malaria, although during exceptionally long and warm summers the second generation may also be of importance. In the south on the other hand transmission extends over several months (with a peak in July and August) and over several generations of mosquitoes. In Central Asia there is a main spring vector and one or two summer vectors.

New cases of vivax malaria with a short incubation period appear mainly during the third quarter of the year (in the south as late as November) new cases of the form with a long incubation period and delayed relapses of the form with a short incubation period appear mainly during the second quarter

(occasionally at the beginning of the third) of the calendar year following that of the year of infection. On the other hand relapses of the form with a long incubation period are seen usually within three months of the primary attack or during the third quarter.

Malaria morbidity in the USSR can be classified into three types: northern, southern and biphasic. The northern type usually shows a single high peak in May or June and represents primary attacks of the form of vivax malaria with a long incubation period. The southern type shows a main peak in August or September with perhaps a minor peak in the spring. The main peak is composed of cases of the vivax malaria with a short incubation period and of cases of falciparum malaria; the spring peak of relapses of vivax malaria from the previous year and of a small number of cases of the vivax malaria with a long incubation period. The biphasic curve seen in various places shows two peaks—one in May/June that is due to cases of the vivax malaria with a long incubation period and relapses of cases of the vivax malaria with a short incubation period; the other generally seen in August due to new cases of vivax and falciparum malaria and to some belated cases of the vivax malaria with a long incubation period.

Soviet malariologists emphasize the uneven focal distribution of malaria in their country and the importance of local climatic and hydrographical conditions on its prevalence.

The transmission season is defined as the whole period during which vectors are infective from feeds obtained during the calendar year. This definition discounts the possibility of a vector's carrying infection over the period of hibernation. In the north the duration of the transmission season is limited to 1 1/2 months (June/July) and in the centre to 2 2 1/2 months (June/August) while in the south it is as much as 5-6 months (April/September). According to one author (1) in the north two thirds of infections used to be contracted in July and one third in August but because of the presence of the form of vivax malaria with a long incubation period the number of cases does not increase

until the next May. Thus in 1948 one sixth of all cases in the north-central part of the Soviet Union were infected in June, one half in July and one third in August. The situation has obviously changed as a result of antimalaria measures.

Entomology

Some methods employed in the Soviet Union for collecting adult mosquitos are of interest. The density of the vector is assessed in capture stations which usually number 10-15 per village. Mosquitos are collected by pyrethrum spray catch or by hand in which case either test tubes or various suction devices are used or in one method a small cage with a sleeve fitted with a wide glass tube. For the outdoor collection of biting Diptera and the quantitative assessment of their density and biting rate, net traps of various designs and sizes are used.

Six species of *Anopheles* have been recorded in the USSR. They are the *A. maculipennis* complex which is present throughout the whole country; *A. superpictus* which is an important vector of malaria in the Central Asian republics in the Caucasus and on the shores of the Black and Caspian Seas; *A. pulcherrimus* which is common in several regions of Central Asia and Transcaucasia; *A. hyrcanus* which is widespread in the Altai area near the mouths of the Ural and Volga rivers in Moldavia in Central Asia and in the Caucasus and is the only vector of malaria in the far east of the USSR; *A. bifurcatus* which is common in the European part of the USSR in western Siberia in the Caucasus and in Central Asia (it is not a vector of malaria as a rule but in the foothills of the Caucasus and in Central Asia may play some part in transmission); and *A. plumbeus* which has been recorded in the North Caucasus and elsewhere and may in exceptional conditions become a temporary vector of malaria. *A. maculipennis* and *A. superpictus* are considered to be the principal endophilic vectors. The remaining four are exophilic, found mainly out of

doors and only exceptionally in human dwellings or cattle sheds. Special monographs on malaria vectors in Transcaucasia and Central Asia have been produced.

The physiology and behaviour of malaria vectors have been the subject of careful study. One author found that 90-92.5% of anophelines die during the aquatic stage of their development. Nevertheless the total number of those surviving to adulthood can be huge in areas where the transmission season is not more than two to three months long: one hectare (2.47 acres, 11,960 sq yards) of water surface produces 1-2 million adult mosquitos per season. In areas where the transmission season is longer the figure can obviously be much greater.

The longevity of malaria vectors and its relationship to infectivity have been studied by Soviet entomologists and epidemiologists for several years with results of great interest. The physiological age of insect vectors is often the best criterion of the efficacy of control and indeed it is held that the rational planning of antimalaria measures requires knowledge not only of the general biology of the vector but also of its longevity or at least of the number of blood feeds it has taken. As early as 1903 it was pointed out that a study of the ovaries of the female would probably furnish the most promising method of age grouping. In 1947-1948 Polovodova found that each oviposition left a dilatation in the follicular tube of the ovary, the number of dilatations corresponding to the number of gonotrophic cycles and giving a direct indication of the physiological age. It was subsequently shown that each dilatation is formed by the contraction of the ruptured follicular sac left by the mature egg after its passage from the site of growth and differentiation into the oviduct prior to expulsion. The technique of age grouping based on the number of follicular dilatations is not unduly difficult in *A. maculipennis* and is much used in the Soviet Union.

These discoveries enable the physiological age at which the mosquito becomes potentially dangerous and the mean physiological age of a vector population to be determined. The mosquito can be infected during any of

the gonotrophic cycles and the epidemiological importance of each individual increases with age as the chance of contact between vector source of infection and new victim rises correspondingly. In nature *A. maculipennis* may undergo up to thirteen gonotrophic cycles.

The value of spraying with residual insecticides can be assessed from the mean physiological age of the vector population. Given efficient spraying of the area and an active residual deposit anopheline females which have undergone more than one or two gonotrophic cycles should be virtually absent. Any increase in the mean physiological age on the other hand indicates that the measures applied are insufficient to interrupt transmission. These methods of entomological assessment have been used in various parts of the USSR not only for mosquitos but also for houseflies and other insects.

Clinical aspects and pathology

Soviet authors believe that sporozoites but not schizonts of vivax malaria can cross the placenta into the foetal liver and cause malaria in the new born. During delivery too direct transplacental contact may occur between the maternal blood and the blood of the baby so making intrapartum infections possible.

The clinical periodicity of vivax infections has been the subject of study. In the form with a short incubation period the primary attack occurs within 14-21 days usually in late summer; this is followed by the first series of relapses in the spring or summer of the next year and by the second series of relapses in the spring of the following year. In the form with the long incubation period the primary attack occurs in the spring or some 8-11 months after the infective bite; this is followed in the spring of the subsequent year by a series of relapses.

One of the most interesting clinical pictures described is fulminant tertian malaria which was previously not uncommon in certain areas but is now exceedingly rare. It was usually seen in the spring mainly but

not entirely in children of 4-15 years of age the majority of whom had previously suffered from malaria. Generally the fulminant attack was preceded by a rigor and accompanied by intense headache and vomiting and it was followed by coma, convulsions and death. Schizonts of *P. vivax* were found in the blood and in smears from internal organs. At autopsy the picture was one of cerebral oedema, enlargement of the spleen and liver and pulmonary oedema. Soviet authors regard cerebral oedema as an allergic reaction of the central nervous system to decomposition products of the malaria parasites.

Chemotherapy

Chemotherapy plays a most important part not only in the individual treatment of but also in the general campaign against malaria in the USSR. In all the early control schemes and in the more recent eradication programmes the value of chemotherapy has been fully recognized. Antimalarial drugs have never been regarded as merely auxiliary methods. Indeed it seems that chemotherapy has often been given more emphasis than the residual insecticides since the system in use of treatment and follow up of individual cases offers unique possibilities of attacking the infected and infective human reservoir.

Quinine, used widely until the early thirties, is now employed only exceptionally. Plasmoquine, the first synthetic antimalarial drug produced in the USSR (in 1931) was much used until 1958, especially in combination with other drugs. It is an 8-aminoquinoline of the same general group as plasmoquine or pamaquine but more closely related to rhodoquine. It has now been replaced by quinocide.

Acricine was synthesized in the USSR in 1933 and is still very widely used. Bigumal (=proguanil) was synthesized in the USSR in 1947. Its therapeutic value in falciparum malaria is much emphasized while its prophylactic and sporontocidal effect is made full use of in malaria eradication programmes. Cycloquine (=chloroquine) was recently

synthesized and tried out with good results but does not seem to be widely used. Chloridine (=pyrimethamine) was synthesized in 1953 and is used in the form either of a base or a hydrochloride for the treatment and individual prophylaxis of malaria and for its sporontocidal effects.

Quinocide, another Soviet 8-aminoquinoline compound, was synthesized in 1957. It is a structural isomer of primaquine, the only difference between the two drugs being in the position of the methyl group in the side chain. Much emphasis is placed on the anti-relapse value of this drug in the form of vivax malaria with a long incubation period and on its probable sporontocidal effect.

Combinations of various antimalarials have always been very popular in the USSR.

The greatest attention is paid to cutting relapses short and to the prevention of secondary cases. Antimalarial drugs are administered by the medical and paramedical personnel of a very wide network of hospitals, polyclinics, health centres, dispensaries, antimalaria stations, factory medical units etc. on the basis of early diagnosis, reliable notification, careful records and regular surveillance by house, school or factory visits or by the periodical summoning of former patients to dispensaries or health centres. All patients are repeatedly and emphatically reminded of the importance of reporting any clinical symptoms even remotely resembling those of malaria.

There are three types of chemoprophylaxis in use. First there is individual chemoprophylaxis based on the administration to the whole population exposed to malaria of two tablets of bigumal or acricine once a week during the transmission season. It has been confirmed that in the form of vivax malaria with a long incubation period bigumal delays the primary attack. In the form with a short incubation period the primary attack is prevented but relapses are not. Since 1952 chloridine has been given once a week in some areas with very good results and more recently cycloquine has been used. Individual prophylaxis is now less common because of the general decrease of malaria in the USSR.

Second there is collective prophylaxis which concentrates on the prevention of relapses and of subsequent infection of vectors by carriers. Ten days after the completion of schizontocidal treatment of the acute attack each case of malaria undergoes anti relapse treatment. Subsequently during the transmission season each of these cases is given gametocidal and sporontocidal drugs generally in the form of two tablets of acrinine with plasmodicide or bigumal with plasmodicide for two days every week. The introduction of quinocide has changed this regime and those who after treatment for acute malaria have had a full course of anti relapse treatment with this drug do not undergo further treatment.

Third there is the pre-epidemic chemoprophylaxis carried out in the north of the USSR where the form of vivax malaria with a long incubation period is common. In this area attacks of malaria may be expected in the spring and can be prevented by bigumal or aequine alone or with plasmodicide at the dosages given for collective prophylaxis. Recently quinocide has also been given 2-3 weeks before the time the epidemic is expected.

The duration of the follow up of malaria cases depends on the type of infection. For falciparum malaria it is one year for vivax malaria two and for quartan malaria three. During the first calendar year the patient has a course of treatment followed by anti relapse collective prophylaxis which begins ten days later and lasts throughout the transmission season. During that period (June to August or September) he is examined by the medical unit once a month and during the rest of the year once a quarter. For clinical relapse or asymptomatic parasitaemia focal insecticide spraying of his house and those of his neighbours will be carried out. During the second year the same schedule is applied with special attention to anti relapse treatment of the form of vivax malaria with a long incubation period.

General anti mosquito measures

Houses are equipped with mosquito-proof screens and mosquito nets are used in several

areas of the country. In these localities shelters for domestic animals are so sited as to take advantage of the possible zoophilic habits of the mosquitos. Repellents too of which dimethyl phthalate is the most popular have also been used with varying success. Wide mesh netting impregnated with naphthalene and phenol compounds was introduced in 1939. The value of this method was greatly increased when dimethyl phthalate and dibutyl phthalate jellies became available. These impregnated nets are known in the USSR as Pavlovsky's nets.

Mosquito control measures in the Soviet Union are both comprehensive and widely applied. The classical methods of drainage, filling, intermittent drying, naturalistic control, afforestation and water management are in active use. The larvorous fish *Gambusia affinis* was brought from Italy in 1925 and used in certain areas with conspicuous success. Larvicidal methods have decreased in importance but are still widely used in urban areas near large mosquito breeding places. These methods do not greatly differ from those used elsewhere in the world. Two types of larvicidal oil are employed and applied by various methods. Various larvicidal dusts are also used some as suspensions in a mixture of kerosene, water and soap. The dusting and spraying equipment is very varied.

Space spraying is carried out in areas where there are many winged pests. In houses pyrethrum solutions are used and fumigant candles made of pyrethrum dust, sawdust, saltpetre, starch and water are also employed. For large scale treatment aerial spraying is carried out or DDT and pyrethrum aerosols are dispersed at ground level from liquid concentrates or released by fumigation.

DDT and BHC fumigant canisters and candles are now being increasingly used for the control of mosquitos and other pests. Candles are used mainly for indoor fumigation and are sufficient for one medium sized room canisters which are larger burn for twenty minutes and are much used for the treatment of warehouses and the like as well as for outdoor fumigation. An interesting method is the indoor use of fumigant paper prepared by impregnating blotting paper with

a solution of saltpetre and a 25/ solution of DDT or BHC. The dried paper is hung on wires and burnt.

Dusting and spraying of insecticides from the air have been carried out on a large scale since 1929. The area treated annually during the past years has averaged 3-4 million hectares (7.5-10 million acres). Entomologists and their staff prepare the plans for aerial insecticide dispersion and check the results. The use of helicopters is now coming in.

DDT and BHC have been used on a vast scale since 1950 as wettable powders, dusts, emulsions and pastes and considerable quantities are now being produced. A number of chlorinated insecticides, heterocyclic carbamates and many organo phosphorus insecticides are being tested.

DDT is used for residual spraying of human dwellings while BHC is generally preferred for cattle sheds, stalls and other unoccupied premises. Home made whitewash containing 5/ BHC or 10/ DDT is used in some areas as it has been shown that there is little decomposition of DDT in ordinary white wash. The duration of the residual effect of BHC being much shorter than that of DDT, the official manual advises that spraying with BHC be repeated every 1-1½ months if necessary. The duration of the residual effect of DDT depends naturally on climatic conditions but is stated to be several weeks in the south and several months in the centre and north. In some parts of the USSR DDT deposits have indeed been found to remain active for 12-14 months. Only one DDT spraying a year is carried out in the USSR as a rule though sometimes two are needed in the south.

Three methods of residual spraying are used. The first, the method of complete coverage, is used in all highly malarious rural areas or in localities where the anopheline density is high and the risk of introduction of malaria by immigrants considerable. Complete coverage includes not only human dwellings but also all outhouses. The second, barrier spraying, is employed in some urban areas near large mosquito breeding grounds and the width of the sprayed zone depends on local conditions. With the decrease of

malaria morbidity during recent years the third method, focal spraying, has become much more common and is used for the treatment of a group of houses whenever a case of malaria is discovered during surveillance.

When exophilic vectors are thought to be involved, residual spraying may also be carried out outside inhabited houses under the eaves, in caves, around trees and bushes and elsewhere.

Spraying of cattle and domestic animals in areas where a vector shows zoophilic tendencies was tried out on a small scale in 1948 and has been widely used by at least one malarialogist since 1952. The method which has given good results in some areas is particularly valuable where there is a silk-worm industry, its main drawback being the short duration (about ten days) of the residual effect.

Spraying is carried out by squads of 4-6 sprayers under a supervisor equipped with various types of spraying equipment. Large scale spraying is normally carried out by regional, provincial, district and urban health centres which have a permanent spraying staff and transport. Non-medical organizations are usually requested to assist with transport.

Resistance

No resistance of mosquitos in general or of anophelines in particular to insecticides has been reported from the USSR. References to resistance indeed are surprisingly few in the literature. Resistance of houseflies to DDT and BHC was recorded some years ago and a technical meeting on the problem was held in 1957 at the Moscow Institute of Malaria, Medical Parasitology and Helminthology. The meeting agreed that the problems of arthropod resistance to insecticides should receive more attention, recommended a co-ordinating centre for studies on resistance and drew up a programme of research.

A recent book discusses briefly the problem of resistance to chlorinated hydrocarbons and notes that the results obtained disagree with recent foreign work on the inheritance of the resistant gene. Soviet authors claim that acquired characteristics are inheritable.

and that the inheritance of specific resistance follows this pattern

The susceptibility of mosquitos to insecticides depends on the gonotrophic cycle freshly fed females being less susceptible the most susceptible being those on the wing after hibernation. The period of relatively high tolerance coincides with the diapause

Eradication

A comprehensive programme for the elimination of malaria as a mass disease from the USSR was prepared in 1949 when residual insecticides began to be widely used and was adopted in 1951. It has been carried out with an impressive drive and determination that could not have been possible without adequate medical scientific and auxiliary personnel. In 1956 no less than 2 780 000 persons or about 13% of the entire population worked in one capacity or another in the field of public health there was therefore no shortage of staff for malaria elimination.

From the outset the programme was based on the existing wide network of dispensaries health centres polyclinics and the like. Notification of cases of malaria had been compulsory in some parts of the country ever since 1921. It was extended to other areas in 1947-1948 and registration of cases made a much more stringent procedure has covered the whole of the country since 1951. A comprehensive training programme was put into effect. In addition to chemotherapy and spraying other available methods of control were pressed into use. Technical guidance has been given by the Institute of Malaria Medical Parasitology and Helminthology and by the regional institutes. An outstanding characteristic of the whole programme is the careful planning of anti-malaria measures in relation to both general and specific economic and social development. Public health education has received much emphasis and is carried out by the available and well tried methods of meetings discussion groups pamphlets posters and films.

The eradication programme is now directed by the Division of Communicable Diseases

of the Department of Public Health and Communicable Diseases of the Ministry of Health whereas until recently the Ministry and the corresponding ministries of the republics each had a special malaria division. The Division of Communicable Diseases advised by the Institute of Malaria is responsible for administration and technical planning and for the training of personnel. The epidemiological follow up of cases of malaria is organized jointly with the Division of Medicine of the Ministry of Health the organization of research is vested in the Institute of Malaria and the regional institutes and public health education is organized by the Institute of Health Education of the Ministry of Health. The antimalaria stations which used to be linked with the general national health service and with the medical service of railways and waterways have mostly been merged into the general public health units. There were 2150 of these stations in 1952 and 2000 in 1954.

On the basis of general directives sent out by the Ministry of Health the planning of antimalaria measures within each district is done by the district medical unit with the advice of the corresponding health centre. A preliminary survey is carried out by the village medical and health unit and the district health unit. This plan is submitted to the regional health centre which adopts it after consultation with local collective farming units or industrial organizations. After approval by the regional health department the plan is submitted to the executive board of the region and then to the provincial health department which consolidates the programme for the whole province.

The medical follow up and drug administration are carried out by the hospitals polyclinics dispensaries and other health units. Small scale insecticidal measures are carried out by local health units with the co-operation of other health organizations if necessary. Large scale spraying is always carried out by the district health centre.

Much attention is paid to the blood examination of all fever cases reporting for medical attention. Medical and paramedical

personnel are often reminded of the possibility of malaria in cases of obscure fever and the population is encouraged to go to medical aid centres for the diagnosis and treatment of even minor ailments. All overt cases of malaria and all persons found to be positive for malaria are registered. These registrations are sent monthly to the provincial health authority.

In addition to passive surveillance of this kind there is active surveillance during the transmission season in all areas where malaria used to be common. It is carried out by district health visitors or voluntary drug distributors, visits being made every five or ten days according to the size of the district. All local inhabitants or visitors with fever or vague general symptoms have their blood examined for malaria parasites but no immediate treatment is given. This work is often carried out by non medical personnel such as members of the Red Cross. Mass surveys of the population are also occasionally carried out. Some surveys cover individuals who are known to have had malaria during previous years, who have had undiagnosed fevers, or have come from malarious areas, but in smaller localities the whole population is examined.

The results of this intensive programme have been spectacular. In the largest administrative unit, the Russian Socialist Federated Soviet Republic, the trend of morbidity can be assessed by taking the 1940 figures as 100%. After a peak of 103% in 1945, the percentage fell to 55 in 1948, to 42 in 1949, to 19 in 1950, to 8 in 1951, to 4 in 1952, to 1.5 in 1954 and to 0.25 in 1956.

According to recent information supplied to WHO, the total number of cases of malaria in the USSR was 5097 in 1957 (3652 primary infections and 1445 relapses) and 4678 in 1958 (this figure is provisional).

The figure of 10 cases of malaria per 10 000 population was accepted as the limit above which malaria was regarded as a mass disease. According to this criterion malaria was eliminated as a mass disease from wide areas of the USSR about five years ago.

In 1955 the Ministry of Health prepared a plan for the complete eradication of

malaria by 1960. A number of specialists were sent on detachment to some difficult areas and two regional technical meetings on eradication were held in 1956-1957.

It would be justifiable to say that eradication has already been or is about to be attained in 88% of the total potentially malarious area of the USSR. This undeniable success has been attributed to three simultaneously executed measures which are given in the order of importance attributed to them: first, the early diagnosis of individual cases of the disease; intensive treatment and a careful follow up of each case for not less than two years; second, the use of residual insecticides for the total coverage of an area or for either barrier village or focal spraying; and third, the widespread prevention of mosquito breeding by the use of all available methods.

Plans have been outlined for the post-eradication period 1959-1965. Attention will be concentrated on preventing the introduction of malaria from outside and on improving mosquito control, preferably by antilarval measures. New methods are to be developed for the early recognition of symptomless parasite carriers; anti-relapse treatment is to be improved; better measures of preventing epidemics from imported cases sought; the development of old and new insecticides encouraged; insecticidal methods adapted for use in areas with silkworm industries; and the study of the epidemiology and eradication of malaria in other countries encouraged.

Active surveillance is satisfactory only if every inhabited area can be visited not less than three times a month. This might be difficult in some circumstances and it has been argued that there is a good case for special squads to improve local surveillance activities and to develop new methods of discovering not only all the clinical cases of malaria but also—and this is even more important—*asymptomatic carriers*. The notification of a case of malaria should not be accepted unless the diagnosis is based on a positive blood examination and each proved case of malaria should undergo a full epidemiological investigation by a specialist.

The speeding up of the notification procedure is thus of great importance. The object of the epidemiological investigation is to determine the origin of the notified case to decide if secondary cases are likely to occur and to work out the necessary counter measures. The type and extent of these measures depend on many factors such as the origin of the case, the number of persons affected, the species of the parasite, the relationship of the case in time with the transmission season and the ecology of the vector. As a rule the greater the number of cases the more extensive the measures taken.

Now that malaria is close to the point of eradication in the USSR there are a number of epidemiological points of interest. One is the sharp decrease in the over all incidence of malaria. Another is the absence of any sizeable foci of malaria. Small foci are still to be found indeed and present a potential danger. Falciparum infections have become very rare most cases being of vivax malaria. In all areas including the south the northern seasonal type of tertian malaria is prevalent so that most attacks are in spring and summer. Over the whole potentially malarious area of the Soviet Union there are now three groups

of communities those (by far the most common) where eradication has been achieved and where cases of malaria are totally absent or only in exceptional cases imported, those where malaria persists as a small focus of infection and those where after an absence of cases for one to three years a few local cases have appeared.

From the point of view of an epidemiologist this last group of cases is particularly important and it has been carefully investigated. The results of this investigation have shown that while population movements are occasionally responsible for the reinfestation of a small area the main cause is either premature discontinuance of antimalaria measures or gaps in the system of surveillance. The problem of the importation of cases of malaria from outside the country is also under investigation. The leading Soviet malariologists are emphatic in their warning that the success achieved in the malaria eradication campaign should not lead to a casual attitude to the problem and thus to a premature weakening of a vast organization which is geared to the complete and permanent elimination of malaria from the whole of the USSR.

Meat hygiene

This monograph is a compilation of the experience and knowledge of the leaders in the field of meat hygiene throughout the world. It deals with practical health problems and covers a wide range of present and potential aspects of the meat industry. There is information relating to the training of meat inspectors which should be most useful to administrators of veterinary public health and associated programs involving meat inspection practices. Current meat hygiene practices of European countries are discussed and special problems with respect to tropical countries are brought to the fore.

The monograph is a rich collection of data which can lead to a valuable evolutionary change of meat inspection practices in many areas of the world, including the United States. The reviewer recommends its usefulness for medical health officers, veterinary public health personnel, hygienists, epidemiologists, sanitarians and students.

Oscar Sussman, *American Journal of Public Health* 1957 47 1461

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958 *

4 Improvement of national statistics

It is one thing for a heterogeneous collection of countries ranging from the highly to the poorly developed to agree on international regulations or recommendations in vital and health statistics it is quite another for these countries to set their statistical houses in order by improving their existing systems or by creating new statistical services. WHO has sought to help countries in developing their statistical services by a programme of advice by co-operative action on a national, regional or international scale and by promoting education and training. Advisers in statistics have been appointed to WHO's regional offices, the establishment of national committees on vital and health statistics has been encouraged. WHO centres for the classification of diseases have been created, fellowships in health statistics have been awarded and seminars and training centres on vital and health statistics have been conducted in conjunction with the United Nations and the governments of the countries concerned. WHO has also endeavoured to co-operate with other bodies, international, national, governmental or non-governmental, interested in furthering health statistics.

National committees on vital and health statistics

The idea of national committees was mooted at the International Conference for the Sixth Decennial Revision of the International Lists of Diseases and Causes of Death in 1948. The Conference recommended that governments should set them up in order to co-ordinate statistical activities within each country and to serve as a link between national statistical organizations and WHO. Such committees it was con-

sidered could also study statistical problems of public health importance and make the results of their investigations available to WHO, thus providing it with valuable information on national points of view. Where national co-ordinating bodies already existed as they did in a few countries they could take over these functions as an addition to those they already had.

By 1958 35 national committees had been created while others were in the process of being created. WHO Headquarters in Geneva keeps in close touch with them both to facilitate the exchange of information between them and to bring a variety of material to their attention and through them to the attention of other interested organizations. The WHO Expert Committee on Health Statistics has referred specific problems to them—such as the development of a statistical classification of operations and anaesthetic procedures, the classification of foetal deaths when more than one cause is stated on the death certificate, the terms and definitions used in connexion with morbidity statistics and the study of the accuracy of diagnoses on death certificates with special reference to cancer.

The idea behind these national committees was that they should bring together in each country representatives of the administrative services interested in vital and health statistics. Duplication of activities sometimes occurs among different government agencies or there is uncertainty of responsibility to the detriment of the country's statistics as a whole. It was felt that if representatives met periodically a spirit of co-operation would be generated and statistics would come to be seen not as the exclusive preserve of one or other department but as a subject in which all were interested and to which all could make a contribution. There were no hard

* For the first time, part of the work of WHO in 1958 was included in the Sixth Decennial Revision of the International Lists of Diseases and Causes of Death in 1948. The Conference recommended that governments should set them up in order to co-ordinate statistical activities within each country and to serve as a link between national statistical organizations and WHO. Such committees it was con-

and fast rules laid down about composition or meetings some committees meet regularly some not and the numbers attending depend on conditions in the country. Some committees have been very active and have done a great deal of work both within the country and internationally. They provide a very convenient forum for the discussion of technical problems and for the exchange of information and they transmit to WHO information and reports on their proceedings and studies. These reports often have a stimulating effect on national committees in other countries which are naturally interested in seeing how the same statistical problems are dealt with elsewhere and indeed they may be expected to help to however small an extent in standardizing statistical procedures internationally.

The international aspect of national committees on vital and health statistics was summarized as follows by one of the originators of the idea: "To be comparable from country to country to be useful at the international level part of the statistical product in each country should be the same in all countries. But this means international requirements—and there's the rub! For international requirements have a way of creating difficult procedural problems back in the countries. States and localities where the data must be collected in the first place. In some instances the effort to collect data needed internationally may interfere with local ways of doing things or entail effort that the locality or nation would rather spend on data more acutely needed at home. All this we know and we also know the effect—that international recommendations are sometimes ignored and the international data series represent not all but only some of the countries."

As an essential part of the mechanics of reaching international agreement on statistical matters direct participation of national technicians should be sought and obtained at the planning stage. This is a fundamental principle of the national committee concept. The creation of a national committee is in itself no guarantee that this national objective will be accomplished. But it is difficult to

visualize how it can be accomplished at all in the absence of a national committee."

In 1953 the First International Conference of National Committees on Vital and Health Statistics was convened in London under the auspices of WHO and in close collaboration with the United Nations.² Delegates of 28 Member States were present as well as representatives of the International Labour Office and the International Statistical Institute. The Conference laid down the objectives that national committees should aim at and recommended that any government that had not done so should "review having regard to the particular circumstances of its country the practicability of setting up such a committee." The functions of a national committee would the Conference felt normally be advisory and consultative but it should be free also to consider any other matters within the general scope of its terms of reference and in appropriate circumstances stimulate the undertaking of analysis research and special studies. Its membership should include administrative professional and lay persons concerned with the collection and analysis of health and vital statistics both at the national and at the regional and local levels and it should be able to invite competent persons in special subjects to participate in its work. Its reports should not only go to the government but should also be forwarded periodically to WHO and when appropriate to the United Nations. WHO should circulate such reports summarize information wherever possible and desirable and point to significant developments in the field and to analogous activities in the different countries. Finally WHO might consider the possibility of aiding the national committees to carry out their work more effectively by providing assistance for particular purposes or by fellowships enabling visits to be made to other committees carrying out joint investigations. WHO might also periodically consider on the basis of the information received from the committees whether any action was required on its part and it might

Dunn, H. L. (1954) *Bull. Wild Health Org.* 11: 151
14 *WH O g.* No. R p 5 1954 85

keep in mind the desirability of convening other similar conferences

Fellowships

The need for better statistical and epidemiological information has led to a demand for more trained statisticians of whom there is a serious shortage throughout the world. In 1951 the Expert Committee on Health Statistics recommended that special consideration be given in WHO training programmes to the training of statistical staff and the granting of fellowships for this purpose. The figures for fellowships awarded in health statistics are as follows:

Year	No. of WHO fellowships
1947	4
1948	1
1949	—
1950	7
1951	59
1952	22
1953	21
1954	42
1955	49
1956	39
1957	61
1958	60

From 1952 to 1958 the figures for individual regions were as shown in the table below:

Fellowships are given to selected individuals to spend a period of study at a university or of observation and practical training in the statistical offices of a country more advanced than or otherwise different from their own. The award of these fellowships is a recognition that each country whatever its development must have at least a nucleus of health workers who have acquired the necessary skills and knowledge to impart to their colleagues and students. As a method of promoting technical instruction it is felt to be an investment which gives returns out of all proportion to the original outlay and to be a valuable stimulus of national efforts to improve statistical services. To meet the training needs of a broader group other training opportunities have been devised such as seminars or training centres.

Seminars and training centres

The chief objective of seminars and training centres is to bring responsible statistical workers of various countries in one or more regions together to take part in a programme designed to improve national vital and health statistical services and as a corollary international statistics. There is training in organizational, methodological and analytical techniques of vital and health statistics instruction in the aims and working pro-

WHO FELLOWSHIPS IN HEALTH STATISTICS BY REGION 1952-1958

Region of origin	Year of award							Total
	1952	1953	1954	1955	1956	1957	1958	
Africa				1	1	1		3
America		10	27	25	23	47	35	172
Eastern Mediterranean	1	3	5	8	6	6	15	44
South East Asia	1	4		2	1	4	1	13
Europe	6	2	9	2	1	3	8	31
Western Pacific	14	2	1	11	2		1	31
	22	21	4	49	39	61	60	244

grammes of international agencies in that field dissemination of information on international standards and recommendations for the improvement of national statistics and for the attainment of international comparability and development of close working relationships and co-ordination of effort among the national agencies concerned. Exchange of information and ideas is encouraged and professional contacts are made. This type of training provides practical but more summary and more specialized instruction than is the rule in academic institutions. The seminar makes it available however to a larger number of persons than could take advantage of the fellowship programme. It provides it as far as possible within a region using the language materials and problems of the region as the basis of the training and does so at the minimum cost to the countries and sponsoring organizations.

In accordance with WHO's policy of co-operation most of these seminars and training centres have been sponsored jointly with UN the host government and whatever other organizations are interested. For example in the case of the twelve week Inter American Seminar for Biostatistics held in 1950 with 49 participants the sponsors were the Government of Chile the United Nations the Pan American Sanitary Bureau (which acts as the WHO Regional Office for the Americas) the Inter American Statistical Institute and the National Office of Vital Statistics of the United States Public Health Service. Other training centres or seminars have been a twelve week International Training Centre on Vital Statistics and Health Statistics for South East Asia in Ceylon in 1951 with 2 participants a Training Centre on Vital Statistics and Health Statistics for the Eastern Mediterranean in Cairo in 1951 with 37 participants one in Tokyo in 1952 with 33 participants and one in Afghanistan in 1954 with 38 participants. Yet others have been held in Africa in 1956 with 70 participants and in South East Asia in 1958 with 18 participants. The participants in these seminars and training centres are heterogeneous some medical some not some highly trained in

statistical theory others with only the basic training but engaged in the collection and publication of statistics and therefore with practical experience and they represent a variety of statistical interests official and non official. The result is that the seminars provide a broad conspectus of statistical activities and give sharper relief to the problems of co-ordination between these various interests. In some of them heads of services discuss their problems with experts in others training is by group discussions following lectures and much stress is laid on practical work. In some seminars teaching material is provided by lecture notes reprints of professional articles pamphlets textbooks reports and year books of both national and international agencies material which in itself forms the basis of a useful reference library for each participant. In others the participants take home their own notes and the various reports issued.

The discussions at these regional seminars brought out the need for holding similar reunions in the local languages in individual countries and these have in fact taken place. In 1952 a significant advance in the training of statisticians was made by the establishment of an Inter American Center of Biostatistics in Santiago Chile which was jointly sponsored by WHO the United Nations and the Chilean Government. This Center offers courses of some length covering a variety of special fields in vital and health statistics to statistical personnel in Central and South America and it arranges practical training in the countries of that region. Its first class completed a nine month course in 1953 six months of the course were devoted to academic studies and three to practical training in various programmes in the field. It was attended by 31 students from 15 different countries. In 1956 responsibility for the course was accepted by the University of Chile. By 1958 about 200 students from 19 Spanish speaking countries in South and Central America had been trained in the annual and supplementary courses given by the Center with WHO assistance.

In 1951 WHO held a training course in Geneva for those engaged in coding in

connexion with the application of the International Statistical Classification of Diseases Injuries and Causes of Death 1948 Revision. It was attended by 20 participants from 16 different countries in the European region.

These activities have received full recognition from governments and the publicity given to them, the participation in them of statistical staff from various countries and the stress laid on the importance of international comparability and of national committees on vital and health statistics have created in the regions and in their constituent countries an awareness of the valuable part that improved statistical services can play in national development as well as internationally. The emphasis is on the applied side of statistics so that more efficient use is made of existing staff and resources. WHO does not attempt to duplicate the training to be obtained in academic institutions where the necessary foundations in statistical training are and should be laid.

Consultants in statistics

Apart from fellowships and seminars WHO has sent consultants to advise countries on their statistical services. A senior consultant in statistics has visited a large number of countries and in association with the respective regional offices given advice on the institution of new or improvement of existing services. Most of the regional offices now have advisers to help in the development of adequate statistics throughout the region and in the co-ordination of work done in the various countries. Progress is especially noteworthy in the Americas where zone offices as well as PASB have their own statistical advisers.

A useful medium for imparting knowledge on epidemiology and statistics has been the medical teaching missions sent by WHO to a number of countries especially in the Regions of the Eastern Mediterranean and South East Asia. An example is to be found in the group which went to Israel in 1951.

In 1952 WHO established the principle of participation by statistical consultants in the

work of project teams and field missions so that epidemiology and statistics might receive due consideration in the planning and execution of programmes. There has been an inevitable increase in the desire for guidance in these aspects as a result of the gradual shift from emergency or ad hoc programmes to longer term programmes which synchronizes with a growing interest internationally in co-ordinated research. This policy is doing much to extend knowledge of these sciences into many fields of medicine in most countries of the world.

The increase in the number of internationally co-ordinated research programmes has meant too that growing attention is being paid to such epidemiological and statistical techniques as surveys and controlled field experiments. Inevitably this has called for the application of modern knowledge to the design of such investigations.

Health statistical methods suitable for developing areas

The standard statistical methods for collecting data are not uniformly applicable throughout the world. Apart from purely local differences in methods there are regional differences which embody cumulative experience and common traditions; these indeed are of major significance in explaining existing systems and in pointing the way to improvement. Thus for instance any improvement in the statistical system will require consideration of Islamic culture in countries of the Eastern Mediterranean, of Hispanic traditions in Central and South America and of animist beliefs and tribal organization in tropical Africa.

Detailed knowledge of the local conditions in which diseases and deaths are recorded, of the availability of medical care, of local usage in registration and of the degree of education of registrars in various types of communities not to mention the social and educational level of the population itself are all essential to the intelligent use of statistics and to plans for their improvement. A number of partial solutions may be needed.

Sampling methods have been used and pilot registration areas established. In this connexion semi-skilled medical personnel and even lay personnel have had to be employed to record vital events and their causation. Staff like this cannot provide accurate diagnoses but they can record symptoms roughly and their records taken in conjunction with an approximate age grouping may reveal to health authorities an abnormal frequency of maternal or infant deaths for example or of chest complaints or diarrhoeal diseases.

Keeping apart data of various degrees of technical accuracy and completeness instead of pooling them and arriving at meaningless national aggregates "in itself brings an improvement not only because the grading of data is an incentive to raising the standard of inferior data but because fairly reliable data relating to some urban areas are often available and can be separated from less trustworthy material."

Teaching of statistics

With a view to improving the recording, analysis, interpretation and presentation of statistics of health and disease the WHO Expert Committee on Health Statistics³ has emphasized the importance of teaching elementary statistical methodology to all medical students preferably in the second and third years of their training. Emphasis has also been laid on teaching more advanced statistical methodology and vital statistics to medical and other graduates who are trained for public health posts and the groundwork of medical statistics to non-medical personnel engaged in medical coding, keeping records and preparing statistics in public health offices, hospitals, social security institutions and government departments.

The fifth report of the Committee recognized three main types of statistical workers:⁴

(1) statisticians with comprehensive university training including special training in health statistics

(2) "intermediate staff" such as record keepers, local registrars, heads of small vital and health statistical units, hospital statisticians etc. and

(3) clerical staff.

A careful balance has to be sought between these three types and the needs of particular areas ascertained by survey before appropriate plans for training are made. While the training of personnel of type (1) might be pursued by the granting of fellowships and of type (2) by the organization of international regional training courses, personnel of type (3) could be trained within the country. National administrations, sometimes under the technical guidance of national committees on vital and health statistics, normally provide the training of the last category of staff.

The teaching of health statistics in medical schools is of special value not only because it contributes to the development of the scientific attitude but also because it instructs the future physician on the collection and analysis of data and makes him aware of his responsibility as the primary source of certain important information. The physician's role in issuing death and birth certificates, in notifying disease and in preparing clinical reports on patients under his care is indeed of prime importance. Many of the defects in health statistics are essentially the result of deficient instruction on the physician's part in their production as well as of his ignorance of their importance and uses.

There is however an increasing recognition of the value of statistics to the medical profession. An important step was taken in July 1958 by PAHO and the Faculty of Hygiene and Public Health of the University of São Paulo in convening a conference on the teaching of medical statistics. It was attended by professors of medicine and public health from six South American countries. Suitable teaching courses were outlined, emphasis being placed on the careful selection of practical examples directly associated with the students' medical studies.

Reports of Expert Groups

Preventive medicine and pathology *

Preventive medicine is neither a single unified body of knowledge nor dependent on any one kind of practice. In some instances it consists in the application of specific measures to protect individuals against specific risks in others it is directed to the removal of unfavourable elements from the communal environment and sometimes it is mainly an educative process. ¹ Has sufficient attention been hitherto given to prevention in the teaching of pathology? This is the question that the WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel has sought to answer.

Advances in mechanization and industrialization increase the incidence of certain diseases and injuries. Advances in treatment occurring *pari passu* with those in technology and industry may themselves create diseases and the physician must know exactly how much can be done to prevent them. Radiation, antibiotics and hormones have provided effective weapons against diseases before which doctors were powerless only a few years ago—but these methods of treatment may themselves cause serious disorders. The allergic phenomena which more and more often appear as side effects of penicillin are well known. Anti-inflammatory hormone therapy is known to lead to metabolic changes, reduce resistance to infection

predispose to osteoporosis and often to give rise to gastric disorders and even ulceration.

The pathology of a varied group of diseases thus compels the practitioner when he treats them to give some thought to the prevention of other diseases which his very treatment may initiate. He is therefore led to take certain measures to protect individuals against specific risks. But the removal of unfavourable elements from the communal environment surely means that the physician must concern himself with problems of housing with the "mushroom cities" that grow up with industrial development and with the quality of the air not only at work but in the city in general. In the United States for example beryllium fumes are creating a problem which since more than 600 cases of berylliosis have already been registered is by no means an unimportant one.

It is while he is being taught pathology not when he is specializing that the medical student should become acquainted with the problems of prevention. It would be a pity to leave the study of prevention exclusively to specialists in industrial or occupational medicine.

Preventive medicine sometimes is mainly an educative process. Here again the physician must not only be aware for example of the role played by the dietary deficiencies so common in some countries, he must also advise his patients, telling them for instance of the dangers of excessive consumption of animal fats to which it seems the high incidence of coronary disorders may be attributed. The pathological features of plethora may thus prove as important a study for the human race in the long run as the much more obvious disorders of malnutrition.

WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel (1959) *Summary Report* (WHO Weekly Bulletin No. 175) 30 p. Price 1/9 £0 30 wfr 1. Also published in French and Spanish.

Grundy F & Mackintosh J M (1957) *The teaching of pathology in the medical school* (WHO Weekly Bulletin No. 34) G n a, p 45.

Members of the Committee: D A P A S yn USSR, Dr B Castil man USA, D J B Coll p Ca ad (Ch rm), Dr G H Cooray Ceylon (Vce Chairman), Dr G F H lly Dr H H m p r l F d r a l R p b l c (G r m ny), Dr G P y l n g W r i t U n i d K d d m (R p p r t u), Dr T Y o h d a, J a n Sec et an t Dr J M Mackintosh WHO, Dr E K h n WHO (Secret ry).

prises. Inevitably such independent undertakings prove costly since they do not make use of the technical facilities (laboratories, radiological and other equipment and specialized personnel) available in the hospitals. In avoiding or rectifying this tendency, however, the principle of integration must not be pursued to the extent of monopolizing essential hospital services for preventive examinations. Case finding programmes should be geared to the capacity of hospital services because treatment should rapidly follow detection of cases of disease. These programmes should moreover be planned strictly in relation to the prevalence in the population of the disease concerned to avoid uneconomic mass examinations which might make the cost of diagnosis of the comparatively few cases eventually discovered prohibitive.

Full exploitation of hospitals

When integration between the hospital and the preventive medicine services is achieved it provides valuable opportunities for the systematic detection by the appropriate departments of, for example, uterine cancer, venereal diseases, cardiovascular disorders, psychological difficulties, diabetes, allergies, and unsuspected disorders of the special senses. The individual patient thus enjoys the best possible service since whatever his medical needs may be they are met. Benefits to the general population show themselves in more ways than one: health education can be greatly advanced through ambulatory and domiciliary medical care—the home care of children by visiting nurses, for example, is of great value in promoting better standards of hygiene in the family circle. In the alleviation of disability associated with long-term and chronic maladies (always a problem to the conventional hospital services) domiciliary care is the best solution. Care of the aged likewise should ideally be carried on in their own homes where the attention of nurses and home helps could in the long run provide more economically and far more agreeably the essential services at present often the task of crowded hospitals.

Not only hospitals but also the nursing resources of certain countries might be better utilized by the establishment of a domiciliary care service. The wastage of trained nursing staff often caused by attraction into related careers or by marriage could be checked if part-time employment in a flexible service such as home care were available.

Participating services

The main services which would be expected to contribute to a programme of ambulatory and domiciliary care are defined as dispensaries, polyclinics and out-patient departments, health centres, medical practitioners, industrial medical services, medical rehabilitation centres and intermediate institutions such as day hospitals and night hostels (which would cater for those patients requiring not so much the intensive care of a general hospital but certain specific measures appropriate to the disorder from which they are still suffering).

The functions to be performed by such services would comprise early diagnosis, extra-hospital treatment, referral where necessary for hospital treatment, after-care and medical rehabilitation and health education. The facilities they offer might well be used also for the training of medical and nursing students and for the maintenance and unification of records which could be of value to epidemiological and social research.

In carrying out these varied tasks through such a combination of services, the greatest attention should be given to preserving continuity of care for the patient in the sense that provision should be made for his easy transition from domiciliary or ambulatory to hospital care and back to his original physician.

Need for centralized control

Local conditions must guide the planning of such co-ordinated services. In rural areas with a sufficient number of inhabitants, the

installation of a modestly but efficiently equipped rural hospital would often allow widely scattered medical practitioners to provide better and swifter technical service to patients and would attract the periodic visits of specialists and the settlement of capable physicians and nurses. In large urban districts the defects of the health services tend to spring not from a lack of technical facilities but from their duplication and from failure in collaboration between comparable institutions. The problem of co-ordination is complicated by factors such as the continuous evolution of medical techniques and the tendency of well populated areas to expand often randomly in relation to existing health services. The variety of affiliations public and private of many medical institutions

also presents an administrative obstacle to co-ordination. All these problems suggest the desirability of establishing a central authority with planning and advisory powers to facilitate the rational siting of services for medical care to advise on accounting construction and the training of personnel and to maintain the standards of both the care given and the equipment available. This would do much to ensure that ambulatory and domiciliary care services in particular either (1) are based upon and supplement existing hospital systems of which the traditional inpatient services can never be superseded or (2)—where hospitals do not exist—are carefully designed as an independent organization which will eventually allow the development of a fuller hospital care.

Iron deficiency anaemia

Anaemia constitutes a public health problem of great magnitude particularly in the under-developed and tropical areas of the world. Although also common in the adult male it particularly affects expectant mothers, infants and young children. Malnutrition and chronic blood loss are usually underlying factors.

Iron deficiency anaemia has been found to be the most common type of anaemia in India, Africa and South America. In India analyses of food consumed by sufferers from anaemia indicate that the iron intake is often within or above the levels deemed adequate in North America and Europe. Hence the prevalence of the disease appears to be due to other factors.

Standards of reference even if they be somewhat arbitrary are necessary to detect and evaluate the anaemia problem of a community. Optimal haematological values are identical for tropical and temperate zones and only the necessary correction for altitudes must be made. The report of the WHO Study

Group on Iron Deficiency Anaemia¹ proposes certain haemoglobin values below which anaemia can be considered to exist and the associated haematological values for adults, pregnant women and children of different ages.

For field work where personnel, space and equipment are limited, haemoglobin and haematocrit determinations are both objective and practicable procedures. Simple methods for haemoglobin surveys are the oxyhaemoglobin method using the Gray Wedge photometer, the specific gravity and the Tallqvist method. With regard to haematocrit estimations, when small quantities of blood are available the micro method may be used. A survey of the haematological picture in pregnant or lactating women, infants and young children provides a ready but weighted index of the magnitude of the anaemia problem.

Members of the Study Group: Dr H. F. Kenya, Dr M. Lajtha, Venezuela, Dr M. M. Sidi, Iran, Professor V. Ramalingaswami, India, Professor R. V. L. (Chairman), Professor A. W. Woodruff, United Kingdom, Representative of FAO, Dr R. M. Prasad, N. India, Dr J. M. Bengoa, WHO, Dr R. C. Burgess, WHO (Secretary), Dr J. S. Peterson, WHO, Dr R. C. Steinkamp, USA (Consultant), Dr G. J. Scott, WHO Nutrition Project, USA.

WHO Study Group on Iron Deficiency Anaemia (1959). *R. Port. J. H. A. Org. An. R. Ser. N. 10: 1-35* (ages). Price 1/6 \$0.30 or 5/- 1/- Also published in French and Spanish.

Since there appears to be no appreciable deficiency of iron in most tropical diets other factors must be responsible for this condition. There is evidence that there may be reduced absorption of available iron from these diets which are generally rich in bulky carbohydrate foods and have a high phosphate and phytate content. Again the chronic diarrhoeal conditions which occur frequently in many tropical countries may decrease iron absorption because of the rapid passage of food through the intestinal tract and because of the change they may cause in the intestinal mucosa. Among other factors that may be responsible is the state of protein nutrition. Protein deficiency disease and iron deficiency types of anaemias are widespread in the tropics and several suggestions have been made in the literature that the former plays an important part in the etiology of the latter. However further studies of this association are needed.

With reference to losses of iron from the body 0.5 l mg per day is lost in faeces, urine and sweat and some is lost in desquamated intestinal cells. Of excessive losses of iron from the body in the tropics those caused by hookworm infestation are generally the most important. Although there is evidence to indicate that a significant proportion of the iron contained in the blood lost is reabsorbed, the loss of iron is frequently enough to upset the iron balance. It has also been demonstrated that in some cases of heavy hookworm infestation with considerable blood losses these are reduced as the haemoglobin rises. There is evidence as well that in the climatic conditions characteristic of the tropics the losses in sweat and particularly cell rich sweat may be considerable.

While the recommendations for dietary allowances of the Food and Nutrition Board of the National Research Council of the USA are adequate for persons in a temperate climate who are normally active and healthy they do not appear to be so in tropical areas where food habits differ from those of the USA and where there may be widespread intestinal parasitism. Evaluation of iron requirements should therefore take into consideration not only the usual physio-

logical needs but also interference with absorption and additional iron requirements to meet non physiological losses.

Control or elimination of any underlying disease process such as hookworm is highly desirable but even in the absence of such disease a higher intake of iron in the diet often appears to be necessary. Where the anaemia is not severe this can perhaps best be achieved by the increased consumption of foods naturally rich in iron. On the other hand where it is severe and widespread enrichment of food with inorganic iron may be the best solution. In planning such enrichment consideration will have to be given to the levels of enrichment needed (a) to raise the haemoglobin and (b) to maintain it at a satisfactory level. There are many technical and administrative aspects of food enrichment on a wide scale which present considerable difficulties. Both the introduction of foods naturally rich in iron and the enrichment of foods with inorganic iron must be regarded as long term means of controlling iron deficiency anaemia.

Meantime in areas where iron deficiency anaemia is endemic women will derive great benefit from additional iron in the form of a 3 grain (180 mg) tablet of ferrous sulfate containing 63 mg elemental iron or the equivalent of another iron compound taken once daily throughout pregnancy and the first months of lactation. Should the woman's haemoglobin be below 10 g per 100 ml blood additional iron should be prescribed.

It is unwise and uneconomical to give folic acid and vitamin B₁₂ to pregnant women as a routine since the great majority of anaemias of pregnancy are of the iron deficiency type in which these substances are not required.

There are many aspects of this problem about which more should be known. For example there is limited information on the incidence of the various types of anaemia in different populations. Again although there is ample circumstantial evidence indicating the close association of anaemia with high maternal and infant mortality there is little precise evidence of the extent to which anaemia contributes to mortality morbidity.

and impairment of working capacity. As has already been mentioned, interference with the absorption and metabolism of iron and increased losses of iron from the body occur under certain conditions, but the knowledge of the precise part these play in the production of anaemia is inadequate.

Iron deficiency occurs frequently in infants and young children, but again there is no precise knowledge of its incidence. The relation between anaemia in the mother and

in her newborn child, the iron content of the anaemic mother's milk, and the importance of early marriage and multiple pregnancies are among other matters which require study.

The Group recommends the development of an improved method of haemoglobinometry as a re-assessment of the assimilable iron in foodstuffs and studies to determine whether certain natural foods of high iron content would serve the same purpose as fortification with elemental iron.

Notes and News

Distribution of anophelines in West Africa

A map showing the distribution of anopheline species in West Africa has been produced by the cartographic service of the French Office de la Recherche scientifique et technique d'Outre-Mer. The territories covered include the French Cameroons, Dahomey, Gambia, Ghana, Guinea, Portuguese Guinea, Ivory Coast, Liberia, Nigeria, Senegal, Sierra Leone, Sudan, Togo and Upper Volta. The map, which is issued on three sheets (scale 1/2 000 000), uses the conventional signs for anopheline species approved by the WHO Malaria Conference in Equatorial Africa held at Kampala in 1950 and lists 4 different species. It was prepared by workers at the Laboratoire d'Entomologie, Centre Muraz, Bobo Dioulasso, Upper Volta, and the Institut d'Enseignement et de Recherches tropicales d'Adiopodoume, Abidjan, Ivory Coast, with the co-operation of the Federal Malaria Service, Lagos, Nigeria, and the Liberian Institute for Tropical Medicine, Harbel.

Insecticide testing in Greece

With the increasing development of resistance among certain anopheline species to DDT, dieldrin and BHC, the insecticides most commonly used in malaria eradication programmes, it has become necessary to seek alternative insecticides

Certain organo-phosphorus insecticides may be the answer to the problem, but careful field trials are required before they can be employed on a large scale. An insecticide testing team, consisting of an entomologist, a chemist and a technical assistant, has therefore been set up by WHO to carry out such trials in Skala, Laconia, Greece, with the support of the Greek Government.

The team has the task of assessing the value of each test insecticide with reference to dosage, physico-chemical persistence and the duration of satisfactory control in respect of *Anopheles sacharovi*. The basic physiological susceptibility of *A. sacharovi* adults and larvae will also be studied, as well as the behavioural responses of the adults. The area selected for the tests is particularly suitable for a number of reasons: e.g. the inhabitants live in thickly populated villages situated close to one another; the density of *A. sacharovi* is high, and the species already shows resistance to both DDT and dieldrin.

Malaria Eradication Special Account

A symbolic contribution of \$1000 to the Malaria Eradication Special Account established by WHO was recently made by His Holiness Pope John XXIII. Announcing this gift, Dr M. G. Candau, Director General of WHO, said: "This gesture is very gratifying evidence

of His Holiness's interest in the work of the Organization and provides valuable support for the campaign WHO has undertaken

Training of X ray technicians

A training centre for X ray technicians from various countries in the South East Asia Region is to be set up in Ceylon with the co-operation of the Government of Ceylon and WHO

The centre will be at the School of Radiography General Hospital Colombo which already offers a training course in radiography and radiotherapy. It will give an additional course of training in the maintenance and servicing of X ray equipment and other electro medical apparatus

At least five fellowships a year will be provided by WHO to enable students from countries outside Ceylon to attend the course. The Organization's assistance will also include the provision of an expert electro technician for at least two years as well as some equipment and supplies

Appraisal of WHO fellowships

The main object of the WHO fellowships programme is to provide selected health personnel with advanced training abroad which is not available in their own countries and which is necessary for specific assignments on their return. Up to the end of 1958 9157 fellowships were awarded under this programme to persons from 155 countries or territories who undertook studies in 122 countries or territories. The programme has involved considerable effort and expenditure by the countries which select and propose candidates by WHO itself in planning and administration and above all by the countries and institutions of study which receive the fellows

Since the beginning of the programme therefore ways and means of evaluating and improving it have been sought. In 1958 a review and appraisal of the programme were submitted by the Director General of WHO to the Eleventh World Health Assembly which approved the holding of a Study Group on Appraisal of

Fellowships. This group met in Geneva from 6 to 10 July 1959. Its aims were to exchange knowledge and experience acquired in the course of the programme in different parts of the world, to review developments in the appraisal of fellowships and to suggest improvements in this field. The specific topics discussed included the aims of fellowship appraisal, planning for such appraisal, criteria and methods and aspects requiring further investigation.

An account of the Study Group's work will be published in the Chronicle when its report appears.

Expert Committee on Leprosy

Since the first report of the WHO Expert Committee on Leprosy² appeared in 1953 a number of countries have started mass campaigns against leprosy employing ambulatory treatment. More than one million patients have now been treated in the 26 WHO/UNICEF assisted leprosy projects now in progress in various parts of the world.

The Expert Committee on Leprosy met in Geneva from 3 to 8 August 1959 to review the experience gained and the problems arising in the course of these projects and to outline general policies for their future conduct.

About three million of the world's leprosy patients suffer from deformities and disabilities. The Committee therefore discussed a scheme of classification which might permit uniform data on these conditions to be obtained from different countries. Many of them are preventable or can be corrected by physiotherapy or plastic surgery and the Committee defined the more simple techniques of physical rehabilitation which can be applied in the leprosy control projects now in progress. Existing documentation on the value of BCG and chemoprophylaxis in the treatment of leprosy was carefully studied by the Committee in order to decide on future policy in this domain. Health education and the training of personnel for leprosy campaigns were also examined.

A review of the Committee's work will be published in the Chronicle when its report appears.

Second US National Conference on World Health

From its inception WHO has looked with favour on the formation of committees or groups of citizens to supplement the efforts of its own information services since only an informed public can give intelligent support to the promotion of world health. Such a committee—the National Citizens Committee for World Health—was established in the United States six years ago and has greatly contributed to a better understanding of international health problems in that country.

This year the Committee organized the Second National Conference on World Health which met for three days in Washington last May immediately before the holding of the Twelfth World Health Assembly in Geneva. The Conference was attended by more than 1,000 persons including leaders in the fields of medicine, public health, education, science and industry and representatives of Congress and the executive branch of the Federal Government. Dr. Milton S. Eisenhower, President of Johns Hopkins University, served as Chairman. Dr. Ernest L. Stebbins, President of the National Citizens Committee for WHO, opened the Conference which had as its theme: World health for world peace.

Speaker after speaker stressed the vital part that world health can play in the achievement of world peace and stability. And pervading the Conference was the feeling that the atomic age has placed humanity at a crossroads: the choice lying between the road to annihilation or the road to peace through co-operation. An opinion voiced by several speakers was that of all the fields of international endeavour, world health best provides experience in working together without competition in a cause in which all believe.

America's stake in world health was one of the main subjects of discussion. According to Congressman Walter H. Judd, those countries with the highest health standards have most to gain from improved world health and most to lose from diseases that sweep in from abroad.

One of six forum discussions held during the Conference was devoted to the subject of Health and economic development. Improved health standards are indispensable for any real economic

development; it was maintained since human beings are the richest economic asset in any country. Dr. Abraham Horwitz, Director of the Pan American Sanitary Bureau, which serves as the WHO Regional Office for the Americas, pointed out that the social and economic problems of areas where disease is prevalent can only be solved when some solution has been found for their health problems.

Another point stressed at the Conference was that once people generally recognize their enormous economic stake in the improvement of world health, they will be more generous in their contributions for this purpose. It was urged that the major contributing nations of the world, including the United States, should increase their financial support of WHO. The Conference gave its unanimous support to a proposal before the US Congress for the creation of an International Institute for Health and Medical Research which would work in close co-operation with WHO. It also unanimously supported the plan to hold an International Health and Medical Research Year which is to be reconsidered at the Thirteenth World Health Assembly in 1960.

A number of suggestions were made for the expansion of international health activities. The following aims were suggested: mass control of preventable disease; provision of modern health and medical services to the total world population; and advancement of medical science by pooling knowledge and skills and by developing medical research potentialities throughout the world. For the achievement of these aims, it was advocated that far greater reliance should be placed on WHO and that United States bilateral health programmes should be directly related to world-wide goals and priorities established by the Organization. It was also urged that WHO should expand its work on the health aspects of atomic radiation and that it should be supplied with the necessary funds to accelerate research on the baffling diseases such as cancer, heart disease and arthritis.

Biological Standardization

Meeting in Geneva from 31 August to 5 September 1959, the WHO Expert Committee on Biological Standardization reviewed work in progress on a number of substances for which

international standards or reference preparations have been proposed. There was a general discussion on the collaborative studies for testing the antigenic potency of different vaccine preparations including the proposed international reference preparations of poliomyelitis vaccine, cholera vaccine, smallpox vaccine and typhoid vaccine. Other topics included methods of implementing a scheme for the large scale production of cholera and typhoid vaccines both for standardization purposes and for future field

trials and the question of the worldwide distribution of reagents such as diagnostic sera for virus identification and typing sera for streptococci, salmonella etc. The texts of the Requirements for Smallpox Vaccine and the General Requirements for the Sterility of Biological Substances as formulated by recent study groups were reviewed.

An account of the Committee's work will be published in the Chronicle when its report appears.

People and Places

Rural health services in Nigeria

In co-operation with UNICEF WHO is at present taking part in a project to improve rural health services—particularly maternal and child health services—in the Eastern Region of Nigeria.

Mr Alan G. Livingston of the United States has been appointed health inspector tutor to this project for a period of two years. He will conduct the training of public health inspectors and sanitary overseers at the School of Hygiene, Aba, and will supervise practical training and subsequent activities in the Nsukka rural health demonstration area. Mr Livingston has had extensive experience as a sanitarian and from 1955 to 1957 held the position of Associate in Public Health at the University of California from which he obtained his degree as a public health sanitarian.

Leprosy Advisory Team

A WHO Leprosy Advisory Team was recently formed to collect and improve the quality of information on leprosy control projects to assess the results obtained to give advice when requested on new projects and to advise regional offices and Headquarters on control measures and any special problems that may be referred to it.

Dr Victor M. Domínguez who has been appointed leader of the team was director of the leprosy campaign in Spanish Guinea for many years and has worked as a WHO consultant for leprosy projects in Africa.

Evaluation of BCG vaccination programmes

Dr Robert T. Neubauer, Dean of the Medical Faculty, Ljubljana, Yugoslavia, is to undertake an evaluation of BCG mass vaccination programmes assisted by WHO and UNICEF. He will visit various countries where projects are in operation and prepare a report on the technical value of BCG vaccination and its place in tuberculosis control for the next session of the WHO Executive Board in January 1960. Dr Neubauer has had a long career in the field of tuberculosis and has acted as consultant for WHO on various occasions during the past eight years.

Kwashiorkor survey in Malaya

There is evidence that kwashiorkor is not uncommon in Malaya possibly because the beliefs held by Malays about child feeding and their attitudes towards modern medical science favour widespread malnutrition. In order to define the problem more exactly WHO is conducting a co-ordinated clinical and anthropological survey of the population to determine the factors responsible for the high prevalence of the disease.

Dr H. A. P. C. Oomen, Chief of the Nutrition Section, Institute of Tropical Hygiene and Geographical Pathology, Royal Tropical Institute, Amsterdam, recently went to Malaya to conduct the clinical side of the survey. Educated at the State University, Utrecht, Dr Oomen has wide experience of nutrition problems in tropical

countries. He has been Chief Medical Nutritionist in a WHO project to assess the significance of child malnutrition in Indonesia, and has taken part in an investigation of child malnutrition in non self governing territories in the Pacific which was carried out under the auspices of the South Pacific Commission.

Malaria field research

The WHO-assisted malaria project which has been in operation in the French Cameroons since 1952 is in three separate parts: a pilot project in the vicinity of Yaounde (southern Cameroons), a mass campaign in the north and a second mass campaign in the south. In the savannah region of the north transmission is intense and its interruption is not easy in the thick forest belt in the south however conditions seem to be favourable for the interruption of transmission by residual spraying alone. Comparative trials of insecticides and experiments in mass chemoprophylaxis are taking place this year. The pilot project in Yaounde will form the centre of a surveillance experiment which will involve discontinuing residual spraying and relying on efficient case detection and treatment to break the chain of transmission. If the experiment is successful surveillance will be extended in the forest belt to the south.

Professor G. Livadas of Greece is to assist with this programme by advising the Government of the French Cameroons on the continuation in 1959 and 1960 of the detailed epidemiological investigations in the pilot zone of Yaounde, the intensification of research on the entomological aspects of transmission in the two mass campaigns, the carrying out of two experiments combining chemoprophylaxis and residual spraying, one in the south and the other in the north, the continuation of residual spraying in the areas covered by the project with a close watch on the possible development of resistance to dieldrin, the training of specialized personnel with a view to establishing a surveillance system in the pilot zone of Yaounde where spraying is expected to be withdrawn before the end of 1959 and the preparation of a plan of operations aimed at the interruption of malaria transmission in the project zones.

Professor Livadas served as Regional Malaria Adviser in the South East Asia Region of WHO

from 1951 to 1953. Following his retirement on reaching the age limit, he has been employed by the Organization as a short term consultant on several occasions.

Pre-eradication malaria survey in Korea

The first WHO field team to be assigned to the Republic of Korea will shortly undertake a malaria survey of the country as a preliminary to eradication operations. Mr Saturnino G. Guerrero who has been appointed laboratory technician on the team, has been a malaria control supervisor with the Division of Malaria, Department of Health of the Philippines since 1955. He has also served as malaria technician with the Philippine National Development Corporation and with the United States Public Health Service in the Philippines.

Public Health Administrator for Turkey

As Public Health Administrator and WHO Representative in Turkey Dr P. V. Olle will have the task of advising the Government on assistance which could be provided by WHO through its regular or technical assistance funds for the development of the country's health services. He will also co-ordinate the work of WHO field teams in Turkey and represent the WHO Regional Office for Europe in meetings with other agencies. A graduate of the Faculty of Medicine of the University of Toulouse, Dr Olle served as public health adviser in Turkey in 1952-1953. Before taking up his present assignment he was Medecin Inspecteur Divisionnaire de la Santé in Fort-de-France.

Control of infectious diseases in Ceylon

Dr Zvonimir Maretic has been assigned as WHO adviser at Angoda Fever Hospital, Ceylon with the task of assisting the Government in the prevention and control of infectious diseases. Educated at Zagreb University and the Tropical Institute at Basle where he obtained a diploma in tropical medicine, Dr Maretic was Head of the Department for Communicable Diseases General Hospital, Pula, Yugoslavia before taking up his appointment with WHO.

Headquarters appointments

Dr Richard W. Fay has been appointed Biologist, Division of Environmental Sanitation.

WHO Headquarters replacing Dr Don W Micks who is returning to the University of Texas Medical Branch as Professor of Medical Entomology Dr Fay who is a well known research worker on insect resistance and vector control studied entomology at the Iowa State College subsequently receiving his Ph.D from the University of Illinois From 1942 to 1948 Dr Fay served with the United States malaria control body for war areas When this body was converted into the Technical Development Laboratories Communicable Disease Center US Public Health Service Savannah Ga in 1948 Dr Fay remained on the staff his most recent post being that of Assistant Chief of the Biology Section He has acted as a consultant

to WHO on a number of occasions and has served on the WHO Expert Committee on Insecticides

Expansion of work has made it necessary to create a second post of Veterinarian in the Veterinary Public Health unit of the Division of Communicable Disease Services WHO Headquarters Dr M Abdussalam lately Professor of Pathology and Bacteriology College of Animal Husbandry Lahore Pakistan has been appointed to the new post Dr Abdussalam has specialized in work on viral and parasitic diseases of animals at the University of Cambridge England Washington State College Pullman USA and the Indian Veterinary Research Institute Mukteswar and is a Fellow of the Pakistan Academy of Sciences

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A NEW EPOCH IN TUBERCULOSIS

The new situation created by the advent of potent anti-tuberculous drugs—first streptomycin in 1944, the PAS and isoniazid—has come upon the world almost unawares and the profound implications it carries are only just beginning to be grasped. For millions of people, though, in the world there is now hope of a remedy which was previously the answer to no. The medical profession too is now faced with a change in methods of treatment and prevention of tuberculosis that may alter its approach to problems of control. The oncoming emergence from the extensive investigations carried out by WHO in co-operation with a number of agencies and governments throughout India and Denmark. The findings of a commission based on the final report published as recent WHO Bulletin.

In advanced countries

Until about 15 years ago the prospects for the control of tuberculosis could hardly be called promising even in advanced countries. Control of the disease depended on improvements in living standards and medical treatment based essentially on the sanatorium was designed to provide the patient with the optimum environmental conditions for recovery. But the sanatorium did not cure him; it was merely a means of removing him from an environment in which he was a perpetual danger to those around him and of giving him what as a rule he lacked—an adequate diet and plenty of fresh air and rest in bed. Nor did collapse therapy or surgery seek to do more than give the patient a better chance to recover on his own; if indeed he did recover. Tuberculosis was felt to be a disease that would persist as long as living conditions were anywhere less than good and at least pockets of infection were therefore thought to be inevitable for the foreseeable future.

Nevertheless the mortality rate in tuberculosis has declined steadily in the past hundred years in the advanced countries. This change for the better has been attributed to rising standards of living, less malnutrition, better housing, less overcrowding, improved sanitation and the greater availability of

medical facilities. Now that the treatment of tuberculosis is effective and relatively standardized, is it possible to envisage the reduction of the mortality rate to zero or even the complete eradication of the disease from the community in these advanced countries?

The ideal country in which to seek an answer to this question would be small, homogeneous in its population and its characteristics well equipped to conduct an inquiry and unlikely to be swamped by the multitude of cases met during the investigation. Such a country is Denmark, already ahead of most countries in its tuberculosis services. The incidence of tuberculosis, a recent visitor to Denmark remarks, has fallen faster and further there than in England and Wales. This he attributes *inter alia* to a more centralized system of control suited to a small country but hardly practicable in a large one.²

Tuberculosis morbidity and mortality rate in Denmark have been among the lowest in the world for some decades. This is generally believed outside Denmark to be due to the extensive use of BCG vaccination, but in fact BCG was used for the first time on a large scale only in the years 1948-1952, by which time the annual mortality rate from pulmonary tuberculosis was already down to about 12 and the annual morbidity

rate to about 60 per 100 000. As late as the end of 1947 only 5.10% of the population had been vaccinated. After that however it became the accepted practice to vaccinate all tuberculin negative children when they entered school at the age of 7. The incidence of pulmonary tuberculosis for Copenhagen and the rest of Denmark in the years 1920-1957 is shown in Fig 1 and the mortality from all forms for the same period in Fig 2. As will be seen from Fig 1 the incidence of pulmonary tuberculosis is high in Copenhagen as compared with the rest of the country.

In 1950 the Danish Tuberculosis Index was established as a co-operative undertaking of the National Health Service of Denmark and the WHO Tuberculosis Research Office in Copenhagen and it was responsible for the technical direction of the mass campaign which took place in 1950.

FIG 1 INCIDENCE OF PULMONARY TUBERCULOSIS PER 100 000 PER YEAR BY SEX IN DENMARK 1920-1957

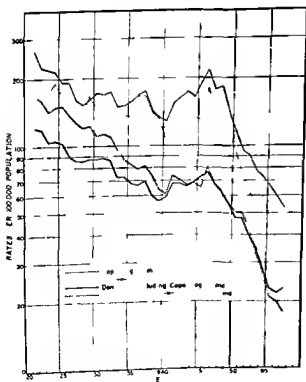
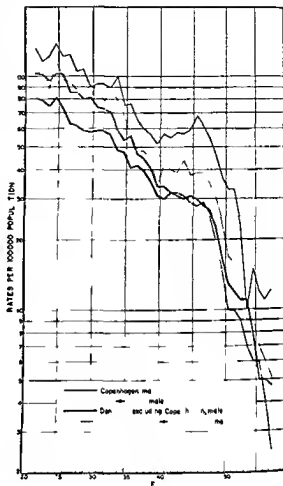


FIG 2 MORTALITY FROM ALL FORMS OF TUBERCULOSIS PER 100 000 PER YEAR BY SEX IN DENMARK 1920-1957



1952 The entire country was covered by the campaign except for certain areas where campaigns had already been carried out. Tuberculin tests, X-ray examinations and vaccinations were performed by specially trained teams, the co-operation of the county chest clinics being enlisted. Uniform and exact procedures for the examinations and for writing and handling the records were devised. Pre-school children and the adult population aged 15-34 were individually invited to come for a tuberculin test, a photo-fluorogram of the chest and BCG vaccination if indicated. Persons over 35 were not individually invited but were informed

through the radio and the press that they were welcome to attend for examination. Schoolchildren were not invited because since 1949 they were being tuberculin tested and vaccinated at school. Great care was taken to ensure that the tests were properly read and the X-ray films were double checked. The records were kept on special cards later transferred to punch cards and finally assembled into three main card files in the office of the Danish Tuberculosis Index. Special precautions were found to be necessary at all stages since experience had shown that continuous close supervision and frequent repetition of instructions were very necessary for both the field and the central office personnel. Particular attention was paid to the size of the tuberculin reaction not only because it enabled a distinction to be made between positive and negative reactors but also because its size was found to be related in young persons to the risk of contracting active tuberculosis later.

The census population is fairly well represented numerically by the population examined in the age group 15-45. Above the age of 45 however only about 12% of the census population was examined. Follow up studies in the first three years after the campaign show however that the group examined is representative of the general population in respect of the prevalence of tuberculosis. As was expected the percentage of unvaccinated positive reactors increases with age sharply in men less sharply in women. Only a small proportion of these had suspicious shadows in their chest X-rays but the follow up studies show that this is the group which is especially liable to develop active tuberculosis. Among the 795 000 adults examined 503 previously unknown cases of active pulmonary tuberculosis were found—a rate of one case per 1500 examined. The unvaccinated tuberculin positive population comprised less than half of the total population examined but contributed nearly 90% of the active cases found the rate being considerably higher in women. Relatively few cases were found in the campaign among young persons relatively many among older persons.

During the 31-4 years of the follow up 878 new cases of tuberculosis were diagnosed in the population classified as healthy at the time of the mass campaign of these 742 had the pulmonary form. All of the 17 deaths occurred in unvaccinated tuberculin positive individuals. In this group too the case rates among adults are 5.8 times higher than those for comparable ages in the group vaccinated during the campaign. On the whole the age group 15-24 shows the highest incidence of tuberculosis during the follow up period. In respect of this age group it may be said that if the risk of those vaccinated in the campaign is taken as unity the risk of unvaccinated tuberculin positive reactors is eight times as great and of persons vaccinated before the campaign twice as great. It follows that the major source of infection in the entire Danish population must be the unvaccinated tuberculin positive reactors indeed 76% of all new cases appeared in this group.

This group can be divided into those whose lungs appear normal on X-ray and those whose lungs have suspicious shadows. For the person with normal lungs the average annual case rate of tuberculosis for all ages is only 27 per 100 000 but for those with suspicious shadows the case rate is 370 which is almost 14 times as great. The latter represent less than 0.5% of the total healthy population but run an extremely high risk of contracting the disease. They can be classified as persons with definite lung lesions probably of tuberculous origin persons with definite lung lesions probably not of tuberculous origin persons with questionable shadows in the lung field and persons with definite or questionable pathological lesions in the pleura or hilum. The individuals with definite lung lesions of probable tuberculous origin form a major risk group. These individuals have a tuberculosis case rate 76 times greater than that of the minimal risk group those whose photofluorograms were read as normal.

The situation revealed by the mass campaign and by what information was available on those portions of the population of Denmark not examined is that approximately

60% of the entire adult population has had a natural tuberculous infection and that 85-90% of new cases arise from that section. From the same section however can be isolated a major risk group of about 1200 persons who can be identified by the tuberculin test and X-rayed and who are mainly responsible for the new cases.

The authors of the report conclude from this situation that the time has come in Denmark for a review of traditional methods of tuberculosis control. These methods based on the constant X-raying of as many of the population as possible have been effective in the past but now require to be brought into line with present knowledge of foci of infection in the population and recent developments in treatment. Already in Denmark routine X-raying of children has been abolished and in some areas routine BCG vaccination of infants and children will be abolished until the last year of school. The tuberculin test can then be used every year to find the few children who have already had natural infections and the even smaller number who will become infected in the future. The enormous numbers of routine X-rays now being taken can be drastically reduced. Older persons with normal photofluorogram findings need not be recalled for examination year after year. But persons of any age with suspicious lesions and young persons with large tuberculin reactions should be followed up systematically. These high risk groups form such a small percentage of the population that continuous and close supervision is practicable. The stage has thus now been reached in Denmark and obviously in other advanced countries as well when attention can be focussed on the small proportion of people who run the greatest danger of contracting tuberculosis. The disease can then be detected at an early stage and treated effectively before it is allowed to spread. In this way it may be expected to decline with increasing speed towards vanishing point.

In the less developed countries

In the less developed countries the situation with regard to tuberculosis is far from

being as promising as it is in the more advanced countries. Social and economic conditions favour the spread of the disease and hospitals and sanatoria are too few to cope with the numbers of patients who require treatment. There is no question in these countries of confining attention to high risk patients only; the problem is rather one of trying to make some impression on the disease with woefully inadequate staff and resources. In India for example the number of tuberculosis beds is 23 000 but the number of infectious cases has been estimated variously at $2\frac{1}{2}$ and $1\frac{1}{2}$ million. Any development in treatment that would lessen the demand for sanatorium beds must therefore be welcomed.

An attempt has been made in India to compare treatment at home with treatment in a sanatorium. The study was undertaken by the Tuberculosis Chemotherapy Centre, Madras, which was set up in 1956 under the joint auspices of WHO, the Indian Council of Medical Research, the Madras State Government and the Medical Research Council of Great Britain. Most of the patients came from the poorest sections of the population of Madras City and for inclusion in the study had to satisfy certain conditions: for example they had to be over 12 years of age, have had no previous treatment with drugs (or not more than two weeks of treatment), have sputum positive for tubercle bacilli, be prepared to co-operate and live in a specified area. Certain patients were excluded, such as those who were too ill for home treatment or had leprosy or other serious diseases or were pregnant. In all 193 patients were selected and allocated randomly 96 to home treatment, 97 to sanatorium treatment.

The patients were given isoniazid and the sodium salt of para-aminosalicylic acid (sodium PAS), the form, prescribed dosage and schedule of administration being the same both at home and in the sanatorium. The majority of home patients attended the Centre once weekly to collect supplies of medicine; in addition a visit was paid to their homes at intervals—rarely less than twice a month—to deliver sputum specimen

bottles and to collect specimens of urine. They were encouraged to rest when ill but to return to work when fit to do so. Otherwise they continued to live in their poor and overcrowded homes as they had been accustomed to do and most of them were ambulant for much of the time. By contrast those in the sanatorium had the advantage of rest, good nursing, good accommodation, supervised administration of medicine and a good diet.

The comparison lasted a year and the patients were carefully assessed medically, radiographically and bacteriologically before, during and after the study, double checking being employed to ensure that the assessment by X-ray was thorough. Although the procedure for random allocation of treatment was rigorously observed, the two series were later found to have differed by chance in important radiographic and bacteriological respects before the start of treatment, but the general conclusions are not affected by this.

The most important finding was that even though the males treated at home were at an initial disadvantage radiographically and bacteriologically, there was little to choose between them and those treated in the sanatorium over the 12-month period. The sanatorium patients gained much more weight as might have been expected and the response of the erythrocyte sedimentation rate was greater. But the most important responses, the radiographic and bacteriological, were at most only slightly in favour of the sanatorium patients. At the end of the period 10 of the patients, both at home and in the sanatorium, had bacteriologically active disease assessed on the basis of very stringent criteria.

Radiographically and bacteriologically the females treated at home were in poorer condition than those in the sanatorium and this makes it less easy to interpret the results. If allowance is made for pre-treatment differences by statistical standardization, the response to treatment is radiographically similar, but the females treated at home responded less well bacteriologically. Nevertheless the conclusion reached is that

the difference between the response to treatment at home and in the sanatorium of females in a similar clinical condition is small.

These satisfactory findings were obtained in home patients even though most had major lesions and many had unfavourable clinical features at the start of treatment. It seems likely that if the disease could be diagnosed at an earlier stage either by mass radiography or by persuading the people to come earlier for examination, the results of treatment at home would be even better. They might also be better if the drug combination were changed when patients appeared unlikely as judged by the persistence of positive sputum to respond to isoniazid and PAS in the quantities prescribed.

Another important finding was that patients at home co-operated excellently. When the study was being planned, the general consensus of opinion both in India and Europe had been that it would be very difficult to obtain the co-operation of a high proportion of patients in treatment at home even for as long as 3 months, but that patients would welcome sanatorium treatment. Not only was this view about patients at home proved to be wrong, but it was actually found extremely difficult to persuade patients to remain under sanatorium treatment for a long period of time.

The general conclusion reached is that on the whole it is possible to obtain good results from treatment at home for at least a period of 12 months. Provided therefore that it can be shown that relapse is infrequent and that there is no special risk to contacts, there may be nothing much to gain from admitting the general run of patients to a sanatorium. Selected cases would still require hospitalization if for example they were seriously ill. The experience of the Centre also suggests that certain minimum facilities are necessary for the organization of a satisfactory domiciliary service based on a tuberculosis clinic, an adequate supply of drugs, alternative drugs for patients who do not respond satisfactorily, enough supervisory staff including a social worker and a public health nurse, an efficient appointment system, sufficient transport, a small number of hospital beds

for special or emergency cases a suitable laboratory and the resources to give at least limited financial assistance in case of particular need. The medical care given during this study was obviously of a higher standard than could be expected to be provided in

many other parts of the world but in spite of this the conclusion reached is of the greatest importance for it carries implications that place the whole question of the treatment of tuberculosis in the less developed countries in a new light

LIVE VACCINES FOR POLIOMYELITIS

The development of an inactivated polio myelitis vaccine by Salk is generally recognized to be an important step towards the control of the paralytic form of poliomyelitis. However most infections with poliovirus do not result in paralysis there are large areas throughout the world where infection is widespread but paralysis is rare and indeed in all areas the proportion of paralytic to symptomless infections is low. In the areas of rare paralysis the balance between infection and immunity is almost as favourable as has been achieved by artificial means in any other infectious disease. The reason for this appears to be that the virus of poliomyelitis multiplies readily in the alimentary tract of infants and young children and at this age symptoms follow infection less frequently and are usually less severe than when primary infection occurs in older children and adults thus the balance between infection and immunity depends on the dissemination of relatively avirulent viruses among children at an early age.

Theoretically oral administration of live attenuated poliovirus at an early age would reproduce this situation. However the vaccine virus administered is excreted in the stools and may infect others. Obviously therefore the dissemination of live viruses which in practice is what oral vaccination would amount to even though the viruses were shown in the laboratory to be of low virulence is not a measure to be undertaken lightly since the virus excreted by the vaccinated person may be of increased virulence. The WHO Expert Committee on Poliomyelitis which met in July 1957¹ after reviewing the

information available on the use of live attenuated polioviruses as immunizing agents felt that their value should be further tested by controlled field trials. It was not the Committee's intention that live vaccine should replace inactivated virus where the latter is in use or is about to be used but rather that it should supplement it or take its place where its use is not feasible. The trials should therefore take place within certain specified population groups and areas and under the careful supervision of an experienced person with adequate time and facilities at his disposal the strains of virus used should be selected with the utmost care and their properties should be measured in a number of different laboratories as a multiple check on pathogenicity. Furthermore careful studies should be done on the characteristics of the viruses excreted.

A number of trials have now with WHO encouragement taken place through the world and in June 1959 the present situation was assessed by a Conference on Live Polio virus Vaccines which was held in Washington D.C. This Conference was convened by WHO and the Pan American Sanitary Bureau which acts as its Regional Office for the Americas and financial assistance was given by the Sister Elizabeth Kenny Foundation.

The Conference recognized the value of the inactivated vaccine in the prevention of paralytic poliomyelitis and recommended that its widespread use should be continued. It is however generally admitted that there are limitations to its use in many parts of the world and that it does not prevent the dissemination of wild polioviruses which constitutes a hazard to non vaccinated per-

sons. There is therefore a place for a vaccine that may be of lower cost, simpler to use and potentially capable of giving greater protection to the community. A vaccine that can be administered orally has obvious merits. Further, there is the possible advantage that such a vaccine virus might replace wild viruses in nature, thus eliminating the threat of paralytogenic strains.

The Conference recognized however that the use of a product which spreads beyond those originally vaccinated represents a radical departure from present practices in human preventive medicine.

The very difficult problems that arise in the development, control and evaluation of the safety and effectiveness of experimental live attenuated poliovirus vaccines were the main concern of the Conference.

Properties of attenuated polioviruses used as oral vaccines

The vaccine strains reported upon at the Conference were generally agreed to be of low virulence for primates. It was apparent, however, that the results obtained on inoculation of monkeys by different investigators varied considerably—a circumstance attributed by some participants to differences in technique and perhaps in animal susceptibility. The desirability of standardizing techniques was emphasized.

Hitherto the criteria of attenuation have depended upon a reduction in the neurovirulence of the virus for monkeys and indeed the strains under study have been selected on this basis. However, several participants expressed the need for the study of properties other than neurovirulence which might be used as additional evidence of the safety of vaccine strains. Among these properties are the degree of invasiveness in vaccinated persons, as shown by the development of viraemia, the genetic stability of the virus in the course of its multiplication in man, and the degree of spread from vaccinated to non-vaccinated contacts.

Two reports presented to the Conference indicated that there was a considerable

difference in the degree of neurovirulence between the three sets of strains studied, as demonstrated in comparative tests by both intracerebral and intraspinal inoculation of monkeys. The differences were particularly apparent in the case of monkeys inoculated intracerebrally.

Recent investigations suggest that the study of genetic "markers" related to virulence may prove very useful. It was emphasized that more work should be done with these new markers.

Properties of polioviruses excreted by vaccinated persons

Several investigators had compared the properties of the vaccine virus with those of the virus subsequently excreted. As low neurovirulence in monkeys—that is to say, an absence of effect after intracerebral inoculation and a low degree of activity by intraspinal inoculation—was the criterion for selecting the strains in the vaccines, this property was regarded by many as the most important measurable index of change of the virus in the course of multiplication in the human alimentary tract. Evidence that there was reversion towards increased monkey neurovirulence in the virus excreted after vaccination had been obtained by several workers in different countries. However, in the studies reported, there was no evidence of progressive increase of neurovirulence in monkeys during prolonged multiplication in the vaccinated individual or after serial passage of the virus in human beings.

Encouraging results were reported with certain recently described genetic markers of polioviruses. These markers could be used for detecting altered strains of greater neurovirulence than that of the vaccine virus itself. More work is needed on this subject because of the importance of differentiating excreted vaccine strains from wild strains of poliovirus.

Field studies

More than 20 field studies from no less than 15 countries were reported at the Conference. Some have been organized

in populations already partly vaccinated with the inactivated vaccine. Most however have been done in highly susceptible populations which had not been given inactivated vaccine.

Both small and large scale studies have usually involved the sequential feeding of children up to 12 years of age or so with the three types of attenuated poliovirus but in some of the most recent studies the simultaneous administration of all three types has been done with apparent demonstration of immunization to all of them. Following this oral vaccination there has usually been a period of surveillance lasting several months in which both vaccinated persons and their associates have been kept under fairly close observation. In the larger studies serological investigations have been done on selected samples of the population and surveillance for illnesses after vaccination instituted. This taking different forms based more or less on existing local public health procedures for detecting illness of any kind in the community at large. In some of the studies where a large segment of the population has received the vaccine attempts have been made to estimate the paralytic polio myelitis rate in the vaccinated as compared with the unvaccinated group. This is admittedly a procedure difficult to interpret particularly from a statistical standpoint.

The studies designed to test the efficiency of the vaccine have yielded different results in different environments. For instance on the basis of the antibody response of vaccinated children who lacked antibodies before vaccination it was reported in some studies as being only 50-60% effective in others as about 90-100%. The antibody response depends on the successful establishment of alimentary infection and evidence was produced to suggest that agents which interfere with this alimentary infection will limit the development of immunity.

The antibody response of the newborn of children of varying ages and of adults including pregnant women has been studied. In general the response in infants and children is better than in adults. The immune status of the individual prior to vaccination obviously has an important bearing on it.

The dose of the vaccine also influences the development of immunity.

The role of interference received much attention in the Conference. Some viruses found in the alimentary tract as well as other polioviruses may prevent infection with the attenuated vaccine virus from becoming established. It was clear that this is a problem which demands much more study.

Little is known about the role of other enterovirus infections in enhancing the invasiveness of attenuated polioviruses.

Earlier reports had suggested that if all three types of polioviruses were administered simultaneously there was interference between them. However recent studies have shown that when a higher dosage of each virus type is used in a trivalent preparation or when the preparation is fed more than once the results are at least as good as or are better than those achieved by feeding the strains consecutively.

The degree of spread of infection to contacts of those vaccinated varies considerably in different situations but in families and in closed institutions spread is common. In countries with a low degree of natural immunity in childhood considerable spread may occur in the non vaccinated population. On the other hand in communities where immunity is acquired at an early age the spread of the vaccine virus appears to be restricted. It has not been possible to follow clearly the natural spread of attenuated poliovirus after its first or second passage.

Since the development of these vaccines each has been widely used under a great variety of circumstances. Studies of great magnitude involving the administration of vaccine to communities of hundreds of thousands of persons have been reported from Africa, Asia, Europe and Latin America and two trials involving several millions from the USSR. Smaller and therefore more carefully controllable studies have been reported from Europe and the United States. The degree of thoroughness with which orally vaccinated persons and their contacts have been observed for evidence of adverse effects has varied greatly in differ-

ent studies however no evidence has been produced that the use of any of the vaccines has been followed by either paralysis or ill defined illnesses in either group greater in amount or number than has been observed in a control group or in the community at large among non vaccinated persons

Although they have uniformly shown significant increases of antibody for all three types of virus and therefore a presumed protective value for the vaccine few of the studies have been conducted under conditions which made it possible to shed light on the value of the vaccine in preventing paralysis This has not been due to defects in the studies but rather to the known low attack rate of paralytic poliomyelitis the extreme variability in the occurrence of the disease and the short time that has elapsed since the vaccines have been administered In most of the studies therefore there has been no attempt to assess effectiveness other than by measurement of the increase in antibody

In a few instances however it has been claimed that use of the vaccines was followed by low rates of poliomyelitis either in those vaccinated or in the community which were consistent with those that might have been expected as a sequel to the use of an effective vaccine Conversely no increased or continued high incidence of poliomyelitis has been reported which would indicate in effectiveness of the vaccine While there are certain differences of opinion as to the interpretation of the results there is general agreement that more studies and longer periods of observation are required before any definite conclusions can be reached on the value of the vaccines in preventing paralysis However taking into account present knowledge of the immunology and pathogenesis of poliomyelitis the Conference agreed generally that it was reasonable to assume that the vaccine was effective if virus was excreted and there was an antibody response

The unskilled worker

In the international assisted mass BCG vaccination programme in which about 300 million people have been tuberculin tested and about 170 million vaccinated, practically all tuberculin tests have been performed and read and the vaccination have been done by so-called technicians who for all practical purposes can be compared with the unskilled worker in industry

During the last few years WHO has devoted much effort to finding ways in which much of the work involved in the different stages of a tuberculosis control programme can be broken down into simple routine manipulations from which practically all subjective judgement is excluded and which can be objectively simplified decisions consisting of a choice between a few clearly defined possibilities this has been based on objective facts This effort has to a great extent been successful and it is therefore possible to visualize a programme in which a large part of the work is performed by technicians Practical experience has shown that when well-standardized methods and techniques are used technicians perform the daily routine work in as reliable a manner as professional staff

THE ECONOMICS OF SEWAGE DISPOSAL

From the most distant past men have tended to form themselves into groups for their own protection. Paradoxically enough something once done to preserve life has led to a series of disasters in particular the great epidemics caused by the insanitary conditions of the earlier urban communities. This situation led in time to the development of measures to improve sanitation—empirical at first later based on solid scientific knowledge. The phenomenal progress made in the conquest of disease during the past 100 years and particularly in the present century has been solidly based on the foundations of sanitation—the provision of adequate supplies of good water and the safe disposal of sewage and trade effluents. The economic aspects of the second of these measures were dealt with in a recent paper¹ by C. B. Toynood which is summarised below. Although referring in particular to conditions in England and Wales the economic principles outlined are of general application.

In 1955/56 expenditure in England and Wales on sewerage and sewage disposal was £26 million of which £10 million was required to pay loan charges on capital expenditure and £16 million to cover annual maintenance costs. This annual cost—two to three man hours² per head—is extremely small in comparison with the benefits it brings.

Sewerage

Both for domestic sewage and for trade effluents the water carriage system is the safest and cheapest since it is continuously available and can be operated with greater facility than cesspools, pail closets or other primitive devices; these advantages more than offset higher loan charges. Of the total expenditure on sewerage and sewage disposal services in England and Wales about one-half relates to sewerage. There is obviously considerable variation in the cost of sewers according to the topography of the district served, the nature of the ground and so on. Apart from these natural factors the main

considerations are (a) the size of the town and density of its population (b) the maximum volumes of flow to be allowed and (c) whether rain water is dealt with in separate or combined sewers

The greater the area of the town the greater the lengths and sizes of the trunk sewers with a corresponding increase in cost per head. On the other hand larger sewers become more economical per unit volume of sewage treated.

One extremely important factor is the total volume of domestic sewage and trade waste to be dealt with. This is practically the same as that of water consumption and has been steadily rising for many years. In England it is often as much as 200 litres per head per day and in the United States of America 800 litres is not unusual.

The cost of sewerage varies also according to whether combined or separate sewers are used. In order to limit the cost of the former they are usually provided with relief overflows which discharge into natural streams. In the case of separate sewers it is not practicable to exclude completely all surface water and it is becoming desirable to accept also the more polluted washings from yards and other areas into the foul water sewers.

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Despite variations current practice is tending towards a sewer capacity of 1 m³ per head per day. The cost of separate sewers for foul water and surface water drainage is obviously higher than that of a combined system but if properly supervised separate sewers have the advantage of preventing the pollution of rivers from overflows in wet weather and this together with other advantages has resulted in their increasing adoption in England.

Uneconomics of pollution

However diluted, liquids containing domestic waste and trade effluents are highly putrescible and may be dangerous to public health.

Where available underground water presents a convenient and cheap source of supply. Pollution of such water may necessitate the provision of an alternative supply at a cost far greater than that of preventing the pollution at its source. Pollution of a river or lake can also reach the point where the water can no longer be used as a source of public supply and may be detrimental to agriculture stock breeding fishing and industry. Pollution of sea water may have harmful effects on fishing bathing and even shipping. Although the material losses involved cannot be accurately assessed they are obviously far higher than the cost of a sewerage system. This of course does not imply that the self purification capacity of a lake or river into which effluent is discharged should be completely disregarded though it should not be overestimated.

Trends in sewage treatment

In the evolution of biological methods for the treatment of sewage the initial process of land irrigation has been intensified by creating increasingly favourable conditions for bacteria to thrive so that purification can now be carried out in a very small fraction of the space originally required. Work formerly needing 100 hectares now needs only 8 hectares of contact beds 4 hectares of percolating filters and 0.4 hectares of activated sludge plant. Sewage

farms of considerable size with large numbers of men to operate them have been replaced by successively smaller works which need less men but call for greater technical skill. The mechanization of modern plants entails a greater capital outlay but lower operating costs. This may be uneconomic in works serving smaller populations and it may be advisable to use simpler plants though they may require proportionately more manual labour.

Scale of operation

The chief factor affecting the cost of sewage treatment for a given degree of purification is the size of the population served by the plant. Other very important factors however are the type of plant to be used the amount of trade effluent to be dealt with local ground conditions etc. Thus only a very broad approximation of the costs per head for populations of different sizes can be given. The following table gives costs in England based on 1958 price levels for complete treatment at new plants the loan charges are based on annual instalments of 6¼% of the capital sum.

P	A	Unit	per	per		T
put	on	Ops	head	head	(man-hour)	1
			cost	cost	1000 hours	
1 000			40	50		90
10 000			24	45		69
50 000			16	30		46
100 000			13	5		38
200 000			11	21		32
500 000			08	17		25
1 000 000			06	16		
1 500 000			05	15		20

The variation from 9 to 2 man hours between the smallest and the largest plants does not represent the whole of the economic gain from the latter for in practice the former would be dealing only with domestic sewage whereas the larger plants would have to accept large volumes of storm water and trade effluents of various kinds.

Regional organization

In the light of the foregoing data the economic gain from the centralization of the various purification services in a single

regional plant can be easily appreciated. The number of communities that can be linked together in this way is limited only by the length of the trunk sewers required. For example, where individual units of 20 000 or 30 000 population can be linked together in one unit serving 500 000, a reduction in annual cost per head of 2 to 3 man hours will be achieved. Each case must be considered on its merits, but the following benefits of centralization should always be borne in mind: greater economy, reduction in the number of sewage plants and operating staff, the possibility of employing specialist technical staff for the whole area, at an economic cost, the greater dilution of trade effluents which would overwhelm small works in many cases, and lastly the considerable balancing effect of a large sewerage system which facilitates the prevention of pollution by overflows of sewage in times of wet weather.

Choice of processes

In this section we shall deal mainly with the economic aspect of some of the most common procedures in use.

Screening or comminution is the most elementary of all forms of treatment and is carried out to remove unsightly solids or in cases where further treatment is to be given to prevent chokeage of the different machines. The cost of this preliminary treatment amounts only to about 3.5% of that of complete treatment.

The removal of settleable solids by sedimentation is relatively easy and cheap. By such means it is possible to remove up to 70% or 80% of the suspended solids which represents a reduction of the biochemical oxygen demand (BOD) load by 40-50%. The cost of this treatment is approximately 10% of that of complete sewage treatment and in modern plants one third of the cost will be absorbed by operation and the balance by capital charges. The factors to be borne in mind are the surface area of the tank and the detention period which is usually between 1½ and 2 hours at maximum flow

but which in dry weather can and should always be increased up to 6 hours without however increasing the tank capacity. The cost of tanks varies according to their size, shape and de-sludging arrangements. The efficiency of sedimentation may be increased by chemical precipitation or mechanical flocculation, although from the economic point of view this is not to be recommended particularly if it is to be followed by biological treatment, the most costly stage of purification.

The activated sludge plant quickly became economically competitive with the traditional percolating filters, although in current practice each has its own place. The construction cost of filters is greater, whereas the operating costs of the activated sludge plant are greater owing to its higher power consumption. In practice the activated sludge process is used more in large scale operation, whereas the percolating filters are more often used in small plants because among other reasons they can be operated by less skilled labour. Including operating costs and loan charges, the total annual costs of biological treatment by filter or activated sludge amount to approximately one man hour per head. For small plants this figure will be greater, particularly in the case of activated sludge. In general, biological purification to advanced nitrification will account for about 40% of the whole cost of complete treatment. In the case of both filters and activated sludge, various processes have been developed in order to reduce operating costs, although generally speaking any success achieved has been at the expense of the quality of purification.

Although both the biological purification processes mentioned are becoming almost universally used, land treatment still has its uses in the increasingly rare places where large areas of land are available. When feasible this is less costly than other processes.

Storm water sedimentation

Where large increases of flow are received in wet weather, river pollution may be prevented to a large extent by sedimentation of excess flow. The cost will not usually

exceed 5% of the over all cost of complete sewage treatment

Sludge disposal

After treatment the quality of the used water can be restored substantially to its original state. This however is only the first stage of the process since up to 1% of the sewage flow may remain as sludge highly putrescible and retentive of water. This may contain 60-65% of the original impurity load of unsatisfied oxygen demand. The various methods used for the treatment of sludge enable this operation to be undertaken at a cost not exceeding about 20% of the total cost of sewage disposal. Among the various sludge treatment processes the principal one is the digestion process which is entirely inoffensive, stabilizes putrescible matter, destroys grease, reduces the quantity of solids by one third or more and allows the separation of large volumes of water. In addition a valuable by-product methane gas is evolved during the process. At present prices the cost in England of a complete plant with tanks for the first and second stages of digestion including operating expenses and loan instalments equivalent to 0.16-0.24 man hours per head. In the disposal of sludge first consideration should be given to its utilization either in the form of fertilizer—if not contaminated by deleterious trade wastes and provided that all harmful grease has been eliminated—or as a source of industrial by-products. The simplest and cheapest method of distributing sludge to agricultural land is to pump it in liquid form. This can be done without undue trouble over a distance of up to 20 km. for longer distances previous drying would be essential.

Alternative Installations

As indicated above the present over all cost of complete treatment of sewage in England ranges for different plants from the annual equivalent of 9 to 2 man hours per head per year according to the size of the community to be served. This total may be apportioned approximately as follows:

	Percentage of total cost
Screening and grit removal	5
Primary sedimentation	10
Biological treatment including final sedimentation	40
Storm water sedimentation	5
Sludge disposal	20
Miscellaneous (including roads landscaping housing of staff laboratory control administration and management etc)	0

These percentages refer to a complete modern plant although savings may be made on certain processes. However the total costs for minimum treatment by sedimentation only might be as low as one third or one-quarter of the over all figures given. In any event the higher the cost the fuller the treatment. In many places advantage can be taken of the conditions of the ground and if there is any shortage of capital for a modern plant cheaper alternative installations may be used although these call for more labour. Thus certain types of tanks may be replaced by improvised devices which though less satisfactory are very much cheaper. percolating filters may be constructed of rubble or other waste materials and some sewers may be replaced by open earth channels with the minimum of lining etc.

Sewage utilization

Under some conditions the utilization of sewage may reduce the cost of purification. Where water is scarce sewage effluent may be used in industry agriculture and indirectly even for water supply by means of sub-soil filtration or otherwise. Sludge may be used as a fertilizer in places where it can be pumped directly but if it has to be dried in order to transport it for greater distances the operation is uneconomic. In many countries the utilization of methane gas from the digestion of sludge has proved of considerable economic value. At present the normal production for large works in England may represent as much as 15% of the total costs of sewage disposal. In modern plants the methane gas which evolves during biological treatment is used in the activated sludge process which requires a large supply of power that the

sewage arriving at the sewage plant brings with it sufficient fuel for its own purification and disposal is obviously an advantage

Trade effluents

It is fortunate that the natural processes which have been harnessed for dealing with domestic sewage can also be adapted for the satisfactory and cheap treatment of most industrial effluents. It must be borne in mind however that in a minority of cases the effluents owing to their unsuitable composition may impair the biological processes which form an important part of ordinary purification. In such cases a careful watch must be kept on the composition of the effluent and its concentration and some kind of pre treatment may be necessary. In exceptional cases the problem may be sufficiently serious to affect the choice of location of the industry itself. It is advisable that industry should contribute to the operating costs of the purification works in proportion to the volume of waste and the extent to which the different stages of purification are affected. In this way not only is the community relieved of expenditure for which it is not responsible but the industry concerned will also attempt to reduce costs by using plant which reduces the volume or improves the quality of its waste. In England trade effluents account for 20-25% of the present national expenditure for sewage purification, a proportion which will undoubtedly increase rapidly. Furthermore new industries—plastics, artificial silk, DDT and antibiotics to mention but a few—have been developed all producing effluents that make treatment difficult. Another problem that calls for particularly careful attention is the disposal of radioactive waste.

Financing of capital expenditure

In a few cases a community may finance its purification plant out of current revenue but

it is more normal for it to seek a loan to be repaid within a reasonable period. The loan period should be long enough to relieve the community of an excessive burden, taking care however to avoid the possibility of having to replace or extend works before they have been completely paid for. Further the debt should not be passed on to posterity unless the works have been constructed on a long term plan based on an expected rise in the number of users. In England the usual period of repayment of loans for normal structures is 30 years with shorter periods of 10 or 15 years for machinery or other items with a lower expected life. The interest rate depends on capital market availabilities at the time of construction and the amount of annual repayment depends of course on the loan period and the rate of interest. In periods of shortage of capital and high rates of interest it may be advisable to construct cheaper plant even at the expense of increased operating costs. The same trend may be expected in countries where labour costs are low.

* * *

The standard of living enjoyed in any country depends on the health and activity of its inhabitants. In Great Britain in recent times the average life span has been increased by twenty years and there is no doubt of the overwhelming contribution made by improvements in sanitary conditions. It may be claimed therefore that the capital invested in this type of plant has paid handsome dividends. While recognition of the important place in sanitation occupied by the disposal of sewage and trade effluents is only of recent date it is obvious that the penalty of neglecting such an important aspect of sanitation which incidentally can be undertaken at so small a cost may in the long run be a heavy burden on society as a result of the pollution of its natural water supplies.

TRACHOMA CONTROL IN EUROPE

Trachoma is one of the oldest known and most widespread diseases and is still the principal cause of irreversible blindness in the old world. Because of its distribution which takes no account of national boundaries it is a disease which affects us all. The United Nations and WHO is playing a vital part in its control.

Since 1952 WHO with the support of UNICEF has assisted eleven countries in initiating or developing trachoma control projects. The method employed have been prophylaxis by the identification and collective treatment of the age-sex and occupational groups which form the major sources of infection and the routine treatment of cases as a purely curative measure aimed also at preventing disabling complications and sequelae.

By the end of 1958 more than 6 000 000 persons had been examined in these projects and more than 4 000 000 cases of trachoma and associated diseases of the eye had been treated.

Despite very considerable advances in field techniques and methods of treatment there are still some serious deficiencies in the scientific knowledge of the disease and in the armamentarium. The development of more effective prophylaxis has been hampered by the paucity of basic etiological and epidemiological data by the fact that treatment although effective needs to be continued over long periods and by the lack of any means of immunization. Very little has been done as yet in the investigation and control of environmental factors favouring transmission of infection. The recent successful isolation of the virus of trachoma however and its culture in series and in quantity has greatly increased the scope of research in all fields of trachomaology and important advances are expected in the near future.

In October 1958 a European Conference on Trachoma¹ was held in Dubrovnik under

the auspices of the WHO Regional Office for Europe and at the invitation of the Government of Yugoslavia. This Conference marked a new and broader approach to the control of trachoma. Participants were invited from a group of countries (Portugal Spain Italy Yugoslavia Greece and Turkey) in which the environmental conditions the problems of health and disease and the national resources are roughly comparable. They included experts in epidemiology ophthalmology health education statistics and public health administration and the discussions covered all these fields.

The prevalence of trachoma is steadily decreasing in many parts of southern Europe chiefly as a result of improved living conditions but it remains a serious problem in certain areas. The disease is contracted in early childhood and in general the higher the endemicity the earlier the onset. Trachoma is of relatively low contagiousness but it tends to spread in families probably as a result of such habits as the sharing of beds washing water and towels with sufferers from the disease. Not enough is known however of the role of these habits in spreading trachoma, and extensive epidemiological investigations are required.

It was considered that the most rewarding studies would be longitudinal studies of relatively small communities living under well-defined conditions stress being laid on the community and family pattern of trachoma but where only groups could be studied they should be large enough to be representative and there should be adequate controls. Whenever possible epidemiological

¹The report of the Conference forms the basis of this article.

gical studies should be supplemented by controlled field trials. As in so many other fields of health where the data vary from country to country there is no international uniformity in such matters as definitions, diagnostic methods, classifications or criteria for selecting population groups. Efforts have been made by WHO to standardize methods and procedures so that the information produced by any one country is immediately understandable and usable internationally. These efforts should be continued and supported.

The Geneva Classification of Trachoma has proved suitable for diagnosis and the individual record card designed by WHO is very suitable for recording data in a clear and uniform way enabling them to be read easily and processed quickly. It should be used as a basis for national records and routinely in hospitals and dispensaries. The adoption of standard epidemiological tables showing the stage and gravity of the disease in a community by sex and age groups before and after treatment would be valuable. The frequency of trichiasis in different age groups could be used as a single and simple index of severity. In general fewer and simpler tables are required in the statistical evaluation of the results of routine mass campaigns than in field trials and other research projects but the principles of evaluation in each case should be the same. Evaluation of mass treatment should show not only the percentage of cures and improvements but also the subsequent reduction in the incidence of new infections in the community.

Suitable subjects for future studies in the epidemiology of trachoma are

- (1) onset of trachoma (clinical mode of onset)
- (2) age of onset
- (3) mode of transmission
- (4) prevalence of trachoma in relation to race, sex, ethnic group, nationality, religion, profession, unhygienic habits (sharing beds and towels, water supplies, etc.), geographical and

climatic conditions, socio-economic conditions, education and attitude of the people, previous and concomitant diseases, etc.

(5) evolution of the disease in relation to age

(6) severity

(7) complications and sequelae

The Conference discussed the diagnosis of trachoma which is sometimes difficult in early cases especially under field conditions and recommended standard methods for clinical examination. To achieve uniformity in diagnosis ophthalmologists should be encouraged from time to time to work together and compare opinions. Seminars and refresher courses with practical work should be organized both nationally and jointly between countries. And the diagnoses of field workers should be periodically checked by consultants preferably in the presence of the workers so that they may learn from expert opinion.

In the opinion of the Conference the best treatment of trachoma under hospital conditions is by certain of the wide and medium spectrum antibiotics used in combination with sulfonamides. The former act best when applied locally, the latter when given systemically. Under field conditions where the use of sulfonamides presents some risk, antibiotics alone have given satisfactory results. The value of the very economical intermittent method of treatment (i.e. the application twice daily of 1% chlor tetracycline or oxytetracycline on three consecutive days during each of six months) developed by the WHO team in Morocco was confirmed by participants from several other countries.² Promising results were also reported from initial trials in Italy with repository penicillin and repository sulfonamides (sulfamethoxypyridazine) which because they need only infrequent administration raise hopes of the development of even more economical methods of mass treatment.

It was recognized that with modern drug-resolutions of the lesions caused by trachoma

and clinical healing may not occur until weeks or months after the elimination or inactivation of the infective agent. A long follow up period is therefore necessary in mass treatment operations to determine the rates of cure relapse resistance and re-infection.

Dispensaries are necessary in areas where trachoma is endemic as centres for trained field workers who under the supervision of an ophthalmologist can carry out the work of family treatment case finding tracing of contacts and health education. Relatively few ophthalmologists have sufficient training and experience in preventive medicine epidemiology statistics health education and public health administration for the kind of work they will be expected to do and instruction in these subjects should be part of all formal training courses where trachomaology is taught. In countries where trachoma is endemic they should also be included as subjects in the normal medical curriculum. The Conference recommended that WHO should study further the question of educa-

tion and training of personnel engaged on trachoma control.

The need for health education of the public requires no stress. Some of the shortcomings of programmes for trachoma control appear to be due not to the preventive measures taken but to a failure in public relations: the public was ill informed the doctors and nurses knew too little about health education methods to convince the public of the importance of what they were doing. Medical and nursing personnel should have theoretical and practical instruction in modern health education preferably as part of their basic professional training or at least in refresher and in service courses. Schoolteachers should also be trained so that from childhood on people have a solid grounding in human biology and the elementary principles of health.

The Conference recognized the importance in the control of trachoma of environmental sanitation including in particular the provision of adequate water supplies where these are deficient.

BASIC PLANNING IN HEALTH EDUCATION

This title is the subject of a seminar held by the WHO Regional Office for the Eastern Mediterranean in co-operation with the Government of Israel from 3 October to 9 November 1958 at Tel Aviv. The title of the seminar is based on the final part of the seminar which is entitled 'Planning'.

In the less developed countries the general trend in health education is to replace "direct" instruction given by personnel of the national health services or international agencies by indirect instruction in the form of action undertaken by the people themselves with the help of public health personnel and other community workers. There are several reasons for this trend: lack

of public funds; disappointment with the slow rate of progress in areas where direct instruction has been carried out over a period of years; increased knowledge of the way in which people learn and are stimulated to accept changes in their ideas and habits; and increased understanding of how closely health practices are interwoven with the whole fabric of beliefs customs and values. These customs and values cannot rapidly be changed and the aim of the indirect approach is primarily to help people to alter their own environment so that it will be easier for them

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to keep well. It has proved particularly successful in communities not previously accustomed to individual responsibility e.g. in traditionally feudal or tribal societies and where poverty malnutrition endemic diseases and ignorance have combined to produce apathy and inertia.

On the other hand direct health education by the extensive dissemination of information reinforced by the use of audio visual aids is of value in countries with well established health services where people are already confident of their ability to do things for themselves. Whatever method is used it is essential that there should be a direct approach to the people themselves and a full preliminary explanation of any measure proposed for the improvement of their health.

Health education should not be left solely to those with specialized training in this branch of public health but should be the concern of everybody engaged in any form of community welfare work. It has been found however that some medical and public health personnel are not easily persuaded of the importance of the health education aspect of their work. This situation is likely to continue as long as health education is not accorded the same status as other public health activities. The failure to recognize the need for specific health education measures as a definite part of the planning and execution of any public health project is unfortunate because it may lead to resistance to the acceptance of the project by the people whom it is designed to help.

Coordination and organization

In many countries health education activities are in the hands of a number of organizations and individuals operating in an entirely uncoordinated fashion. The proper coordination of health education activities within a country depends primarily upon the existence of a more general co-ordination of the work of governmental voluntary and international organizations concerned with health and social welfare. Much has been done to co-ordinate national and international efforts in this field by the International Union

for Health Education a non governmental organization one of whose main tasks is to promote the creation of national committees and societies for health education.

On the national regional and local levels health education committees should be established under the aegis of the national Ministry of Health and should include representatives from all other agencies concerned with health and social education. The staff selected should be responsible individuals with security of employment and a recognized professional status and funds for health education should be allocated on the same basis as for the other public health services.

Training of personnel

Some familiarity with the principles of health education is essential for all medical personnel and desirable in the case of a few key persons in non medical administrative positions. Theoretical and practical courses in health education should be included in the curricula of all medical public health nursing and midwifery schools and training departments should be established in national Ministries of Health with the following functions: (a) analysis of the country's health education needs (b) recruitment and selection of trainees (c) arrangements for scholarships and fellowships (d) study of the present curricula of the various training schools with reference to their health education content and training methods. The organizers of special courses for teachers social workers religious leaders agricultural workers etc should be encouraged to include health education among the subjects studied. Health education should also be included as a specific topic in seminars or courses on such subjects as mental health public health nursing malaria eradication bilharziasis nutrition maternal and child health tuberculosis etc.

Health education in schools

The main purpose of health education in schools is to enable children to learn enough about health and disease to be able to protect their own health and that of their families.

and the communities in which they live. For this it is essential not only that the child should learn about himself and his environment but that health education in schools should be a practical activity rather than a memorized lesson. Unless that is understood by teachers, parents, school medical staff and the educational authorities, no great progress can be expected.

Health education in schools might be improved by obtaining the co-operation of parent teacher associations, by the school's initiating or taking part in village sanitation or similar campaigns, by preserving the continuity of child health supervision between the health centre and the school so that the public health doctor and nurse who supervise the child's health during his infancy and pre-school years will continue to do so during his school years.

During their training, all teachers should receive simple and practical instruction on the basic facts regarding the promotion and protection of their own health and that of the children in their care, and on the cause and prevention of local health problems. A course for this purpose might cover anatomy and physiology, basic facts of health and hygiene (nutrition, communicable disease, sanitation, etc.), health needs of children in primary and secondary school, common local deviations from health in school children, community health services and resources, principles, methods and media of health education. Teaching should be of practical application (e.g. foods should be known by their health giving properties rather than by their scientific classifications) and combined with practical experience (visits to local health services, interviews with health personnel in their places of work, surveys of local food stuffs or health needs, practice in making and using simple visual aid, etc.). The co-operation of the health authorities should be sought for the continuation and expansion of health education activities in schools.

Community programmes

Improved general education—including in the less developed countries, fundamental or

adult education for the older citizens—usually leads in the long run to improved health. Fundamental education programmes have frequently been the precursors of community development programmes in which the people themselves combine their efforts with those of the government authorities to improve their economic, social and cultural conditions. Health activities naturally play a large part in these programmes and their educational value is immense.

Application to specific activities

Maternal and child health

In the developing countries, the breast fed child will be relatively safe from the two major hazards to child health—malnutrition and gastro-enteritis—if the mother has learned to feed herself so that she can feed her child adequately. Intensive health education is needed in the pre-natal period if good lactation is to be ensured. Health education has a part to play also in the improvement of the environmental conditions—malnutrition, inadequate housing and lack of hygiene—which contribute largely to the high mortality rate observed in children between 1 and 4 years of age in the less developed countries.

Health education should be given not only to the mother but to the whole family. As well as employing such media as the press, the radio and women's papers to the full, maternal and child health personnel should use every possible opportunity for individual or group education. For example, "mothercraft" classes for adolescent village girls have proved extremely successful and "graduates" of such classes have later played a useful part in health education activities in their own villages.

Instruction in health education methods and techniques should be introduced into the training of all maternal and child health personnel.

Malaria eradication

Education of the public is needed at every stage of a malaria eradication campaign to ensure that the measures taken are understood, accepted and properly carried out.

During the spraying phase the people must understand the need for total coverage of all dwellings and the need to refrain from whitewashing and replastering which might destroy the insecticide

During treatment they must be willing to allow blood smears to be taken and to follow the course of treatment regularly. This is particularly difficult since whatever form of treatment is used it will involve constant supervision of the person under treatment and the reluctance of most villagers to spend periods of time in hospital or away from home is well known

During the surveillance phase constant health education will be needed to maintain interest in and a sense of responsibility for the success of the campaign. Especially when measures against the mosquito cease people are apt to lose interest and become negligent

Health education should therefore be an integral part of all malaria eradication campaigns. The educational programme should start before the attack phase and should be evaluated and adjusted periodically as the campaign develops

In countries where rural health services are well organized the health education side of the campaign should be undertaken by the personnel of those services during the consolidation and maintenance phases. In others towards the end of the consolidation phase and during the maintenance phase the malaria eradication organization should be used as a nucleus for the development of the rural health services and the already partly trained workers should be given further training to enable them to be absorbed into these services

Environmental sanitation and bilharziasis

Health education is particularly important in schemes for improved environmental sanitation since these often involve changes in deep rooted habits and customs. If there is a well organized health education department with adequate field staff in the country they should have ample time to prepare the community for the acceptance of sanitary improvements before any work is begun. On the other hand the sanitarian may be the first health worker in a particular area and the preliminary education must be earned out by him

In the case of bilharziasis the existence of sanitary latrines, clean drinking water and dispensaries for the treatment of infected individuals is a prerequisite to effective education on the cause and prevention of the disease. The examination of newcomers to controlled areas and the siting of villages away from infected water are more likely to be accepted and accomplished once the people have experienced the value of initial sanitary improvements

* * *

The remaining hazards to public health are increasingly those which involve for their control not only the application of certain recognized techniques but changes in the economic and educational level of the people. Their final eradication demands not only knowledge of the cause and means of prevention among professional health workers but also the understanding and voluntary co-operation of the people themselves. This can be achieved through intensive health education

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958*

5 International collection and publication of data

The Fourth World Health Assembly decided that one of the main aims of the Organization should be gradually to build up a body of sound statistical information and advice covering all parts of the world by which the policy of the Organization could be guided and its operations and their results measured. Another aim was to encourage the various branches and regions of the Organization to make the fullest use of the statistical data and facilities available at WHO Headquarters.¹

This was a formal confirmation of the function of collection, analysis and publication of statistical and epidemiological data which as already noted has been one of those undertaken by international health agencies since their inception. By Articles 63 and 64 of WHO's Constitution each Member State must communicate promptly to the Organization important laws, regulations, official reports and statistics pertaining to health which have been published in the State concerned and provide statistical and epidemiological reports in a manner to be determined by the World Health Assembly. Something has already been said about the action taken by WHO both to continue and extend systems of collecting and publishing medical and health statistical data and to undertake or report epidemiological studies. Certain further features of this basic work require noting as in one sense there is no more important work initially in the field of epidemiology and statistics than that of persuading, encouraging and assisting countries to make their own arrangements for recording morbidity and mortality and for ensuring the widest use of the statistics for public health and research purposes.

General epidemiological and statistical data

WHO inherited the statutory rights and obligations of the OIHP and of the Health Division of the United Nations Relief and Rehabilitation Administration (UNRRA) (which had assumed responsibility for OIHP's duties in January 1945) in respect of international quarantine² and the machinery of the Health Organisation of the League of Nations for the collection of general epidemiological and statistical information. Under the International Sanitary Regulations (WHO Regulations No. 2) the health administrations of a large number of countries throughout the world have the responsibility of reporting the appearance of quarantinable diseases—cholera, plague, epidemic (louse borne) typhus, relapsing fever, smallpox and yellow fever—to WHO. In its turn WHO has the responsibility of sending this information to all health administrations and this it does by a daily broadcast over an international radio network and by publication in the *Weekly Epidemiological Record* which is a legacy from the League of Nations and has been in existence for more than thirty years. The Record also contains notes based on current statistical data on incidence of certain non-quarantinable diseases such as influenza and poliomyelitis whenever their spread becomes of international importance.

A vast amount of statistical material is received by WHO in weekly, 10-day, fortnightly, monthly, quarterly and annual reports which are furnished by the health and statistical departments of most countries in the world and by many local statistical offices. They include national and local statistical reports and tables from over 250 countries and territories. These reports

The earlier part of the account of WHO work in epidemiology and statistics appeared in WHO Chronicle 1958, 13, 21-23, 378.

Off. Rec. Wld Hlth Org. 1, 2, 35, 18.

form a heterogeneous mass varying despite WHO's efforts at standardization in form accuracy completeness definition and classification and in the type of data supplied. While many countries and territories do not provide health statistics mainly because of lack of physicians and of registration officials and machinery in general it may be stated that such vital and health statistics as are available to governments of Member States are sent to WHO. Also under Article 61 of WHO's Constitution each Member State is required to report annually to the Organization on the action taken and progress achieved in improving the health of its people and these annual reports contain a proportion of statistical information.

The statistical data collected are classified and extracted at WHO headquarters in Geneva and form the basis of the *Epidemiological and Vital Statistics Report* a compilation which has been published by WHO monthly since June 1947 and which contains statistics on disease general mortality infant mortality and birth rates in certain countries and statistical tables on epidemiological and demographic topics. It has for example included tables showing specific death rates for selected countries in cancer (of various types) certain communicable diseases alcoholism arteriosclerosis accidents etc. It is a lineal descendant of the *Monthly Epidemiological Report* issued by the League of Nations from 1922 on. A year book is published *Annual Epidemiological and Vital Statistics* with a time lag of about two years as detailed figures are not as a rule supplied immediately by local administrations. This annual volume contains tables of population general vital statistics and causes of death according to age and sex and cases of and deaths from notifiable diseases. In addition it provides tables of death rates from selected causes by age and by sex the seasonal distribution of notifiable diseases and numbers of health personnel hospitals establishments and vaccinations in many countries. The tables on vital statistics owe much to the United Nations and its Statistical Office in New York.

Responsibility of UN and WHO

It is pertinent here to outline the relative responsibilities for the collection of statistical data of the United Nations and WHO. In order to avoid duplication of effort and overlapping in the collection of information the various fields of vital and health statistics are covered as follows:

- (a) *Population data—aggregates and by age and sex*
collected by the UN
published by both agencies WHO reproducing the UN figures exclusively
- (b) *Births—numbers and rates*
data collected by the UN
published by both agencies WHO reproducing the UN figures exclusively
- (c) *Stillbirths—numbers and rates*
data collected by the UN
published by both agencies WHO reproducing the UN figures exclusively
- (d) *Fertility data*
collected and published by the UN
material supplied by the UN to WHO as and when required for particular purposes or publications
- (e) *Marriages*
data collected and published by the UN
- (f) *Life table functions*
data collected and published by the UN
material supplied by the UN to WHO as and when required for particular purposes or publications
- (g) *Deaths by age and sex*
data collected by the UN and published by both agencies
data on infant deaths collected by the UN with the sub classifications requested by WHO
- (h) *Deaths by cause subdivided by age and sex*
data according to the Abridged International List collected by the UN and supplied by the UN to WHO.

The following table shows the distribution of responsibilities between the United Nations and WHO for the collection and publication of statistical data.

Field	United Nations	WHO
Population (aggregates and by age and sex)	Collected and published	Reproduced
Births (numbers and rates)	Collected and published	Reproduced
Stillbirths (numbers and rates)	Collected and published	Reproduced
Fertility data	Collected and published	Material supplied as required
Marriages	Collected and published	Material supplied as required
Life table functions	Collected and published	Material supplied as required
Deaths by age and sex	Collected and published	Material supplied as required
Deaths by cause subdivided by age and sex	Collected and published	Material supplied as required

additional data according to the Detailed International List collected by WHO when desired the UN being informed of each such collection

publication by the UN of aggregates by each cause of the Abridged List

publication by WHO of such aggregates and of details by age and sex for each cause of the Abridged List and for such additional detailed causes as may be deemed desirable

- (i) *Communicable diseases*
data collected and published by WHO
- (j) *Morbidity*
data collected and published by WHO
- (k) *Medical institutions and public health measures*
data collected and published by WHO and communicated to the UN in the form of final tables for publication purposes together with technical notes on qualifications attaching to the data
- (l) *Medical and sanitary personnel and institutions*
data collected and published by WHO and communicated to the UN in the form of final tables for publication purposes together with technical notes on qualifications attaching to the data
- (m) *Population vital and health statistics of cities*
in the case of cities adjacent to ports and airports and also of aggregates of cities WHO collects data on population births deaths and diseases as required for such cities to meet their special epidemiological requirements the UN collects and publishes population and vital statistics on cities as part of its programme coverage of communities according to size

Special health data

Continuing a practice begun by the League of Nations WHO has maintained records of the numbers of physicians dentists midwives nurses pharmacists and veterinar

ians as notified by countries These records now cover a period of 25 years and since 1950 details have been published for about 180 countries and territories The data are difficult to report in a uniform way because of the differences in professional qualifications and because reports vary in completeness and accuracy

Data on national hospital establishments are also recorded with the numbers of hospitals and hospital beds by categories i.e. general maternity sanatoria leprosanaria etc

In 1953 the public health reports (annual and occasional) and special related official reports containing health statistical information were classified in the United Nations Library Geneva the International Labour Office and WHO Headquarters Library and a list prepared and published as a supplement to the *WHO Library News*⁴ It gives a selection of those official reports of countries which deal specifically with public health or medical subjects and are issued annually as separate publications In some countries e.g. Canada and the United States of America where important health functions are decentralized available provincial or state reports are included but reports from smaller administrative units such as local authorities and cities are not The classification revealed that annual reports were not complete and were being prepared irregularly An effort is therefore being made especially by the statistical advisers of the regional offices to assist countries in improving them since they are of immediate value administratively to the national health services as well as being helpful to workers both at the local and the international level

Through such official and other collections the WHO library and reference system is coming to play a more direct role in the collation of published statistical and epidemiological material It is helping in combination with the other statistical services both headquarters and regional to make WHO a major if not the chief repository of essential world and regional data statistical and epidemiological

Other publications

Apart from its periodical statistical publications WHO publishes the *Bulletin of the World Health Organization* its principal scientific organ which prints articles of international significance falling within the scope of WHO's interest and activities. Statistical and epidemiological articles appear in it periodically. One whole issue of the *Bulletin* in 1954⁵ was devoted to health statistics and one in 1956⁶ to epidemiology each covering a wide range of subjects. In the case of the statistical number these included the use of sampling for vital registration and statistics, the securing of appreciation of health statistics needs in vital and health statistics in the less developed countries and future objectives of national committees on vital and health statistics. The epidemiological number included such subjects as cancer of the breast, poliomyelitis, accident mortality amongst children, protein malnutrition and endemic goitre. Recent numbers of the *Bulletin* on such subjects as bilharziasis⁷ endemic goitre⁸ virus

diseases⁹ the treponematoses¹⁰ and malaria¹¹ also dealt with various epidemiological and statistical aspects of these subjects.

In its earlier years the WHO *Epidemiological and Vital Statistics Report* contained statistical studies on such subjects as the evolution of mortality in Europe during the twentieth century, recent birth rate trends, the present state of population growth and the influence of the decline in mortality on growth of population.¹

The reports of the Expert Committee on Health Statistics are of great value in the study of international statistics. They appear in the WHO *Technical Report Series*¹² and cover a wide range of international statistics.

All these publications reflect the increasing application of statistical and epidemiological methods to WHO programmes. But while the quality of the statistics published by WHO continues to be dependent upon the reliability, completeness and comprehensiveness of the information collected at the source, which fall far short of what they might be, it cannot be said that there is any ground for complacency about them.

B H Wld Hlth O g	1954	11	1
B H Wld Hlth Org	1956	15	1
B H Wld Hlth O g	1958	18	658
B H Wld Hlth O g	1958	18	1

B H Wld Hlth O g	1957	17	865
B H Wld Hlth O g	1956	15	863
B H Wld Hlth O g	1956	15	361
Epid. t. l. S. t. R. p.	1949	2	64 19 1950 3 30
1951	4 36	1947 1 38	1948 1 33 1950 S 191
Wld Hlth O g t. h. R. p. S.	1950 S	1950 25	1951 33
1957	133	1959	164

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B II Wld Hlth Org 1954 11 1
B II Wld Hlth Org 1956 15 1
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B II Wld Hlth Org 1958 18 1

B II Wld Hlth Org 1957 17 865
B II Wld Hlth Org 1956 15 863
B II Wld Hlth Org 1956 15 361
Epid. i. i. S. i. i. R. p. 1949 2 64 192 1950 3 30
1951 4 36 1947 1 38 1948 1 33 1952 5 191
Wld Hlth Org i. h. R. p. S. 1950 5 1950 25 1952 53
1957 133 1959 164

Society's reactions to the mentally ill—whether favourable or unfavourable—are governed by a number of factors. Ideas with regard to mental diseases and their causes are often confused. Some may believe that a mental patient is possessed by a devil and in this case it is the devil that is detested and not the patient. If the disease is considered to be hereditary there is a certain hostility to the patient if on the other hand it is believed to be due to some physical cause he is more readily accepted. There is the fact that what is considered as normal behaviour in one society may be taken as abnormal in another—mental abnormalities may even be subject to fashion. The community also reacts in different ways understandably according to whether the patient is violent and a threat or calm and reserved. Community reactions vary too according to the clinical nature of the disorder. Schizophrenia inspires fear and makes people hostile. The neuroses are better tolerated and may even be viewed with sympathy. The public protects itself against psychopaths by restrictive or punitive measures. Mental defectives are generally regarded with indulgence if not too much is expected of them but the attitude may become hostile if they are a burden upon society. The same opposing reactions are noted with regard to abnormal children. If they are feeble minded or mentally retarded they are pitied as simpletons but if they suffer from behaviour disorders they are considered to be responsible and are judged severely. In developing societies the mental abnormalities of old people are less readily accepted than in others but this attitude is gradually changing.

In addition to the actual structure of a community its social and economic level also affects one way or another the attitude to the mentally ill—according to whether such persons are a burden upon the community or not. The religion and educational system of a community and above all its legislation also have an influence. If the main purpose of the legislation is to protect the community it necessarily implants the idea of punishment with respect to mental disease if on the other hand it aims at

ensuring suitable treatment for mental patients—if for example it provides for voluntary admission to psychiatric establishments—it elicits a favourable reaction from the community mental patients being really regarded as sick persons in need of treatment.

Once community attitudes to mental patients and the reasons for them are known community attitudes to psychiatry in general—to psychiatric establishments to the different types of psychiatric treatment and to psychiatric personnel—require study. If the first task of psychiatry is considered to be isolation of the mental patient and prevention of harm to the community from him the community will have very little inclination to participate in any way in his treatment or rehabilitation. The psychiatric hospital is however now increasingly recognized as a treatment centre—and the successes achieved by modern therapy are very largely responsible for this revised concept. The public is also becoming more and more attuned to the idea of the "open" hospital of extra hospital treatment and of reception centres for mental patients and the out patient clinics in particular are playing a more important role not only in the treatment of mental patients but also in the change in the community attitude to psychiatric activities.

It is also of value to study community attitudes to different types of treatment. One thing seems certain the present more favourable attitude to psychiatry seems to be due at least in part to the fact that mental patients now receive somatic treatment in the same way as other sick people and such treatment often gives rapid and remarkable results. Psychotherapy although still something of a mystery to many people is now fairly easily accepted and at times even has a certain snob value. Social and occupational therapy have also helped greatly to change public opinion about psychiatry. They have shown that many patients can be socially rehabilitated and participate to some extent in the economic activities of the community. Nevertheless the problems connected with this readaptation and economic activity are difficult for they are dependent upon the sufferance of the social group into

The sanitation of international airports depends on many factors: water supply, disposal of sewage and waste from aircraft, control of vector insects or rats. The Committee was of the opinion that the dissemination of its Guide to hygiene and sanitation in aircraft would do much to encourage

a full scale programme for improved sanitation in international airports. The aim of this guide is to provide general instructions on necessary sanitary measures at airports and on aircraft and to indicate sources from which more detailed information on the subject can be obtained.

Social psychiatry and community attitudes *

Social psychiatry refers to the preventive and curative measures which are directed towards the fitting of the [mentally ill] individual for a satisfactory and useful life in terms of his own social environment. This definition is given in the seventh report of the WHO Expert Committee on Mental Health.¹

It is evident that action of this kind can be successful on one condition only: that the psychiatrist has a full knowledge of the social environment in which the patient lives and of the customary attitudes of the community to the mental patient and to those who treat him. This knowledge is in fact indispensable if the community is to be taught to co-operate in the prevention and treatment of mental illness and in the rehabilitation of those who suffer from it. Collective reactions to mental patients vary considerably according to the community concerned. In relatively unchanging agricultural communities persons suffering from mild mental disorders often continue to live with their families—which may be in itself a good thing but which also makes it impossible to reach and treat the patient. In more rapidly developing societies on the other hand the problem is entirely different. In the most highly developed countries the general tendency formerly was to exclude mental patients from society—which led to the creation of large psychiatric hospitals remote from the cities in which

mental patients were interned and cared for by physicians who were called "alienists". Social psychiatry confined itself then to attempts to reintegrate the mental patient into social life but the total absence of social contacts between the community on the one hand and the patient/hospital even the psychiatrist on the other made this task extremely difficult. At the present time the psychiatrist can often bring his patient to the threshold of normal life—but all his efforts are vain if the community in spite of the creation of psychiatric hospitals to which people can go voluntarily of day hospitals, night hostels and therapeutic clubs maintains a hostile or mistrustful attitude to mental patients and those who care for them.

How are we to obtain sufficiently accurate knowledge of community attitudes to mental patients? An outstanding survey was begun in 1950 in the United States by the National Opinion Research Center of Chicago University. The aim was by interviews with more than 3500 persons to describe in detail the characteristic attitudes of the American community to mental diseases and explain the reasons why they assumed the form they did. The British Broadcasting Corporation also made a survey in connexion with a television programme on "The hurt mind" in 1957. Another possible study is that of popular and legal terms applied to the mentally ill. Legislative measures themselves are also often an interesting pointer to community attitudes to mental disease—although such measures are usually out of date in relation to medical practice and public opinion. Finally the way in which the care of mental patients is organized may also partially reflect the community's attitude.

* Expert Committee on Mental Health (1959) *Social Psychiatry*. Geneva: WHO. 1959. 40 pp. P 1/9 \$0.30. *Rep. No. 177*. Also published in French and Spanish. *M. b. r. s. f. t. h. C. m. n. t. e. e. D. S. B. e. t. h. m. Y. g. I. D. R. H. F. I. U. S. A. (Ch. m.) D. R. H. I. m. F. D. M. S. J. e. s. U. S. A. (Ch. m.) D. R. H. I. m. F. N. g. (Rapp. (u.) D. A. M. s. L. e. b. a. D. P. S. a. g. k. e. o. T. h. i. d. (V. e. C. h. m.) D. F. Q. u. C. o. s. t. a. R. a. S. e. c. r. e. t. a. r. y. D. E. E. K. p. f. W. H. O. (S. e. c. r. e. t. a. r. y) D. O. K. i. n. e. g. U. S. A. (C. o. l. l. i. t.) D. M. I. P. e. t. W. H. O.*

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It is also of value to study community attitudes to different types of treatment. One thing seems certain the present more favourable attitude to psychiatry seems to be due at least in part to the fact that mental patients now receive somatic treatment in the same way as other sick people and such treatment often gives rapid and remarkable results. Psychotherapy although still something of a mystery to many people is now fairly easily accepted and at times even has a certain snob value. Social and occupational therapy have also helped greatly to change public opinion about psychiatry: they have shown that many patients can be socially rehabilitated and participate to some extent in the economic activities of the community. Nevertheless the problems connected with this readaptation and economic activity are difficult for they are dependent upon the sufferance of the social group into

which the patient is to be reintegrated and of his potential employer. The mere fact of having been mentally ill may prejudice chances of employment. If the patient is protected by appropriate legislation the difficulties are less. In Britain for example mental patients and the physically disabled are cared for under a system of rehabilitation organized by the Ministry of Labour factories or workshops are reserved for the seriously disabled and there are 14 industrial rehabilitation centres which take mentally ill patients who are still in hospital.

The more favourable community attitude to psychiatric institutions and treatment is accompanied by less hostility to psychiatric personnel. The hostility—or even fear—which the psychiatrist formerly inspired was probably due to the circumstances in which he worked: the absence of effective treatment, patients interned in prison like hospitals etc. all of which were bound to provoke mistrust and hopelessness. Nowadays the creation and development of psychiatric services within the general hospitals and the development of out patient clinics have brought the psychiatrist closer to the community and made him known as a physician who treats and cures sick people.

This improvement in the community attitude to psychiatry is therefore the first aim of social psychiatry, but it is an aim that can only be achieved by developing active forms of treatment that can be applied without segregation of patients, by making psychiatric activities an integral part of general public health work—or at least by co-ordinating them with it—and by informing and educating public opinion.

The public must be informed, but gradually and with discretion, bearing in mind that unsuitable or ambiguous language may create a wrong impression: an approach must be made to selected groups with whom special points can be discussed. Whatever the method chosen as a general rule the greatest caution must be exercised.

The educators, if they are to be successful, must be adequately trained and made to understand the general principle that the subject of mental health is highly charged

with emotion. The psychiatrist should be in a position to devote a considerable part of his time to improving the professional skills of those who work with him (nurses, social workers etc.). Physicians, whether they work in the hospitals, in the public health services, or in private practice, have an important role to play if only on account of their daily contact with people. In short, if the community attitude to the mentally ill is to be altered, all those who carry any kind of responsibility must play a part: those who draw up laws and those who see that they are applied; leaders in the industrial world, ministers of religion, teachers, the press, the radio and of course the family—for the education of parents is an extremely important factor in the modification of community attitudes. It is they who will form the social conscience of future generations and if they really understand mental illness within their own family and participate in its treatment, will be able to influence other families which may be showing mistrust or hostility.

The report concludes by indicating the kind of research that should be undertaken in order to improve the information and education of the public. It expresses the opinion that in addition to study of community attitudes to mental disorders, mental treatment and psychiatric personnel, there should be investigation of the role played by geographical environment, historical development, cultural patterns, religion, socio-economic class and education. A linguistic analysis of popular terms used for mental illness might be of value and throw some light on community attitudes.

A special study should be made of information and education techniques and of methods of training psychiatric personnel.

Social psychiatry assumes that the mental patient can be restored to a more complex social background and that mental disease can be cured and prevented by creating opportunities for favourable social contacts. These two assumptions cannot be verified, however, unless the community accepts mental illness and maintains its contact with the mentally ill as it does with other illness or ill persons.

Notes and News

DDT water dispersible powders specifications and stability

Water-dispersible powders containing 75 DDT have proved to be among the most useful weapons in the fight against malaria. The suspension properties of these powders have however often been unsatisfactory owing to poor formulations or inadequate packaging. A recent article in the WHO Bulletin deals with the specifications evolved by the United States International Cooperation Administration (ICA) for powders used in ICA supported malaria control or eradication programmes many of which are carried out in conjunction with similar WHO programmes in the same countries.

The first specification concerns packaging for this fibre drums with hermetically sealed plastic linings are recommended. A susceptibility test is specified, the minimum coefficient of susceptibility (percentage of DOT in suspension after 30 minutes) being fixed at 1.5 before and 1 after treatment in simulated tropical conditions. The specifications for the inspection of powder purchased by ICA require a composite sample of each 40 tons to be taken for inspection. The coefficients of susceptibility before and after testing are in general higher than the specified minimum. Despite this sampling however deficient material has been found in some shipments. It was found that if satisfactory and unsatisfactory batches are mixed the susceptibility of the mixture tends towards that of the satisfactory material. This explains why the method of taking composite samples has some times failed to detect unsatisfactory batches and provisions to remedy this situation have now been incorporated in the specifications.

Another article in the same number of the Bulletin deals with the storage stability of

DDT water-dispersible powders. It describes a study of the change in susceptibility of two series of 75% DDT water-dispersible powders during storage in simulated commercial packages at 27°C, 50°C and 65°C and as shelf samples at ambient temperatures. All the products tested in both series were made under the conditions of regular commercial production, and those in the second series were prepared in 1954 for the ICA according to ICA specifications. The results showed that (a) a high initial susceptibility is no criterion of shelf life (b) the measure of susceptibility after the so-called tropical storage pre-treatment is no criterion of stability except perhaps in the case of very poorly formulated products (c) periodic observations made over a month or more of the susceptibility of powders stored in commercial or simulated storage packages at 50°C and 65°C will provide an indication of the probable long term stability of these products and (d) it seems likely that a reasonable estimate of long term storage stability at ambient temperatures could be obtained by subjecting the samples to high temperatures for a very short period.

Factors affecting the susceptibility of DDT water-dispersible powders are discussed in the note that follows.

Susceptibility of DDT and dieldrin water dispersible powders

Experiments to determine the effect of moisture, temperature and pressure on the susceptibility of DDT water-dispersible powders are described in a recent number of the WHO Bulletin. It was found that the removal of moisture brought about a slight increase in susceptibility, that heating for one hour at temperatures below 70°C resulted in an increase in susceptibility due probably to the drying effect of the heat, whereas heating for the same

Received 11.11.55. Gooden E. L. & Johnson D. R. (1955)
Bull. Wld Hlth Org. 2: 913.

Pearce G. W., Goettl G., Mary B. & Sedlak, V. A. (1955)
Bull. Wld Hlth Org. 20: 9.

McIntosh J. W. et al. (1955) B. H. Wld Hlth Org. 20: 937.

period at temperatures above 70 C resulted in a decrease that on prolonged heating at 70 C and 75 C the susceptibility decreased sharply in the first 4 hours but thereafter showed little change up to 20 hours and finally that low pressures—for example 25 g per cm²—had little effect on the susceptibility but that at pressures of 100 pounds per square inch and over it varied in inverse proportion to the logarithm of the pressure

The same number of the Bulletin¹ contains an account of experiments in which various dieldrin water dispersible powder formulations were subjected to high temperature storage and the effect on their susceptibilities compared. Of two products furnished by the Shell Chemical Company each containing 50% dieldrin with Attaclay as diluent AC 1630 is recommended rather than AC 1631 on the basis of superior performance after storage at 50 C and 65 C. In a similar series of tests on 75% dieldrin water dispersible powders Shell formulation AC 1621 which contains Hi Sil as diluent was judged better than AC 6621 which contains Micro Cel as diluent. A series of samples of AC 1621 was subjected to temperatures of 90–120 C for periods of 1–20 hours and the effect on susceptibility determined. Most samples withstood the treatment reasonably well at temperatures up to 110 C for 20 hours.

Insecticides and pesticides

The resistance of insects to DDT, dieldrin and other modern insecticides seriously complicates the fight against the insect borne diseases such as malaria, typhus and yellow fever. So far some 50 species of insects—including flies, mosquitos, roaches, bed bugs, lice and ticks—are reported as being resistant in various parts of the world to one or more insecticides.

A WHO Expert Committee on Insecticides met in Geneva from 14 to 19 September to discuss developments in this field over the past two years. Resistance by anopheline mosquitos to various insecticides in different parts of the world was reviewed, thanks to tests already developed it is now possible to have a fairly complete picture

of the extent and nature of this resistance. The Committee defined tests for physiological resistance in other insects including bed bugs, fleas and sandflies, proposed a test for determining behavioural resistance in adult mosquitos and made detailed recommendations on insect control measures based on the latest insecticide research and field experience and on measures for the control of pests such as rats, mice and scorpions. Means of testing the effectiveness of insect control methods used in aircraft were also discussed.

An account of the Committee's work will be published in the Chronicle when its report appears.

Radiation in the treatment of cancer

A study group convened jointly by the International Atomic Energy Agency (IAEA) and WHO met in Vienna from 3 to 5 August 1959 to discuss radioisotope teletherapy and the use of supervoltage radiation in medicine. Teletherapy is a treatment mainly against malignant tumours which uses a beam of gamma rays from a large source of radioactive material situated at a certain distance from the patient; the cobalt bomb employing the isotope cobalt 60 is the best known application of this method. Supervoltage is a term applied to energies exceeding one million electron volts; supervoltage radiation also employed in the treatment of cancer uses high energy X-rays and beams of particles emanating from accelerators.

The group was of the opinion that these forms of radiotherapy are of definite value in the treatment of cancer though further studies are needed on the radiation doses to be applied in clinical practice as well as the standardization of methods and their clinical evaluation. One of the principal requirements at the present stage is specialized training in the techniques of radiotherapy and the group recommended more training programmes, exchanges of experts and visits to radiotherapy centres in various countries.

The group consisted of 20 radiotherapists and radiation physicists from Canada, France, Germany, Hungary, Italy, Japan, Mexico, Sweden, Switzerland, the United Kingdom, the USA and the USSR.

¹ Parc, G. W., Miles, J. W. & Goett, M. R. B. (1949)
Bull. Wild. Hlth. Org. 20: 947.

Third International Reference Preparation of Cardiolin

The Third International Reference Preparation of Cardiolin has just been established following comparative studies with the Second Standard the supply of which is approaching exhaustion. It is kept at the WHO Reference Centre Statens Seruminstitut Copenhagen.

In a recent number of the WHO Bulletin P. Krag & M. W. Bentzon describe the tests and analyse the results obtained in four laboratories in three different countries.

This preparation is intended to serve as a reference for the evaluation of cardiolins produced by national laboratories or coming from other sources. A cardiolin may be used in serological tests for syphilis if having passed chemical tests (phosphorus, nitrogen and iodine value). It shows the same reactivity as the International Reference Preparation of Cardiolin combined with the International Reference Preparation of Egg Lecithin and a good cholesterol. A valid comparison must include testing on reactive and non-reactive sera such testing to extend over several days. The reactive sera should be tested in a dilution series closer than twofold and each antigen should be tested in duplicate. Any difference between the cardiolin under test and the International Reference Preparation can be accepted only if it is of the same magnitude as the differences found between two cardiolin antigens both composed of the International Reference Preparations and in the same proportions.

Organo-phosphorus dry sugar baits in fly control

The use of organo-phosphorus dry sugar baits which are cheap, easy to apply and present comparatively little risk for domestic animals—has proved extremely successful in the control of houseflies in the United States, achieving up to 98% reduction of fly populations in 4 hours. The method has been shown to be particularly effective against *Musca domestica*. As this species is the major cause of the fly problem in Israel, it was decided to carry out comparative

tests with dry sugar baits in rural areas in that country. The results are described in a recent number of the WHO Bulletin.

The toxicants chosen for testing were mostly mixed with sugar or sugar and sand and scattered from shaker cans. Malathion 2.5%, diazinon 1% and Dipterex 1% gave equally effective results. Chlorthion 1% and malathion 1% and 2% used in smaller quantities were less effective. The value of the method was found, however, to depend on the extent of the breeding sources. In certain farm buildings for instance, where garbage and manure attract flies and encourage dense breeding, the baits may not be sufficiently enticing to ensure the destruction of a large proportion of the fly population. In such cases, unless the use of the baits is accompanied by a serious attempt to improve sanitation, it is to be discouraged, for not only will it fail to overcome the basic problem, but it may hasten resistance to the insecticide employed. Organo-phosphorus sugar baits should therefore be used as the principal control method only in buildings which are not too highly infested; otherwise the bait method should be secondary to sanitation measures.

Public health administration in the USSR

Under the auspices of the WHO Regional Office for Europe, a group of senior public health administrators from 25 European countries took part in a travelling seminar in the USSR from 15 September to 17 October 1959. The participants studied public health administration in various parts of the country, including Moscow, Leningrad, Minsk, Kiev, Yalta and Stalinabad. The programme included visits to medical institutions, medical schools and research establishments, to health services in cities, rural areas and factories, and to sanatoria and spas.

The following countries were represented at the seminar: Albania, Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Monaco, Morocco, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and Yugoslavia.

Expert Committee on Tuberculosis

Tuberculosis is today a problem in every country of the world in fact following the successful control of many other communicable diseases its relative importance has increased in recent years. Although a WHO Expert Committee met in 1953 to discuss tuberculosis vaccination¹ there was no general discussion of tuberculosis by a WHO Expert Committee between 1950² and this year. In the meantime WHO has taken an active part in tuberculosis programmes in all parts of the world and much new knowledge on tuberculosis has been accumulated. Of particular importance is the

introduction of effective and inexpensive anti tuberculosis drugs which can be used for mass chemotherapy on a domiciliary basis this has brought control of tuberculosis within the reach of almost any country.

A WHO Expert Committee on Tuberculosis met in Geneva from 28 September to 3 October to review all aspects of the Organization's anti tuberculosis programme the main subjects of discussion being measurement of the extent of the tuberculosis problem factors influencing the epidemiological behaviour of tuberculosis methods for examination for pulmonary tuberculosis preventive measures treatment case finding organization of a tuberculosis programme and the functions of WHO in a world wide tuberculosis programme.

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People and Places

Tuberculosis chemotherapy

The tuberculosis chemotherapy project in Madras India was started in 1955 and is sponsored jointly by the Indian Government the Madras Government the Indian Council of Medical Research the Medical Research Council of Great Britain and WHO. Its aim is to compare the results of domiciliary and institutional treatment of tuberculosis and to investigate the effect of the drugs used in domiciliary treatment.¹ Dr J. Angel who was recently appointed to the team working on this project was educated at St John's College Cambridge and University College Medical School London. He has had wide experience both in the United Kingdom and the United States of America of the medical care of tuberculosis patients and of undergraduate and post graduate teaching.

A WHO assisted tuberculosis chemotherapy project was recently started in Tunis. Dr Derrick Foskett who is in charge of the project was educated at Cambridge University and at St Thomas's Hospital London and has worked with the tuberculosis services in South Africa

and the public health service of Kenya as well as in India and the Eastern Mediterranean Region. Before taking up his appointment with WHO he was consultant chest physician to the Oxford Regional Hospital Board physician to Peppard Chest Hospital Henley-on-Thames clinical assistant at Brompton Hospital London and BCG officer for the Oxford region.

Nutrition adviser for South East Asia

Dr Ratko Buzina has been appointed nutrition adviser for the South East Asia Region of WHO. In this capacity he will assist governments in planning national nutrition programmes supervise and evaluate nutrition projects of the Region and be responsible for keeping the Regional Office in touch with Headquarters on nutritional matters.

A graduate of the Medical School of the University of Zagreb Dr Buzina has had post graduate training at the University of Basle Switzerland and at the University of Minnesota USA. He has been head of the health service in Croatia Yugoslavia and of the Division of Physiology of Nutrition Central Institute of Hygiene Zagreb.

¹ For further detail on this project, see the article on page 397.

Dental education in Indonesia

Professor J C Middleton Shaw was recently appointed WHO consultant in dental education to the Faculty of Dentistry at Airlangga University Surabaya, Indonesia. He will advise the faculty on methods of developing the structure and organization of dental education and will also act as adviser to the Indonesian Government on the improvement of such education.

Professor Middleton Shaw was for many years Dean of the Faculty of Dentistry, University of Witwatersrand Johannesburg, Union of South Africa, and was a member of the National Health Council, the Council for Scientific and Industrial Research and the Medical and Dental Council of that country.

Malaria field appointments

The failure to control malaria with dieldrin in Liberia led in 1957 to a reorganization of the WHO assisted malaria programme in that country. The disappointing results of the malaria control project were found to be mainly due to the habits of *Anophele gambiae* to its resistance to dieldrin, and to transport difficulties in the dense forest areas. A WHO team with headquarters in Kpa-n was therefore set up to seek means of overcoming these obstacles and of achieving interruption of transmission. Dr R O Darwish of the United Arab Republic (Province of Egypt) was recently appointed to the team as entomologist. He holds a Ph.D. in entomology from Edinburgh University and has also studied parasitology and entomology at the London School of Hygiene and Tropical Medicine and the Istituto Superiore di Sanita, Rome. He has served with the Egyptian Ministry of Public Health as field officer in a campaign for the eradication of *A. g. ni*.

Since August 1956 WHO and UNICEF have been helping the Government of Afghanistan to consolidate its malaria control campaign and to convert it gradually into a nationwide eradication campaign. Dr S L Dhur of India, who has been appointed to this project as senior WHO malariologist, was until recently Regional Deputy Director in the Indian Malaria Co-ordination Organization. Cuttack with responsibility for malaria operations in an area with a population of 60 million. He is familiar with malaria work in Afghanistan where he has already served as a

WHO expert. He has also served with the WHO-assisted malaria project in Indonesia.

Staffing requirements for hospital nursing services

A guide on staffing requirements for hospital nursing services is being prepared by WHO with the assistance of Miss Marguerite Paetznick, Director of Nursing Service, Denver Department of Health and Hospitals, Colorado, USA. In connection with this assignment, she will visit certain countries in the Eastern Mediterranean Region where she will study factors influencing nursing service administration.

A graduate of the University of Minnesota, Miss Paetznick holds a Master's degree in nursing from the University of Washington, Seattle. She has wide experience of nursing administration and served for three years on the Commission for the Care of the Patient, sponsored by the American Medical Association, the American Hospital Association and the American Nurses Association.

WHO Area Representative in Ceylon

Dr T C Puri, who for the past two years has been WHO Area Representative in Burma, has now been assigned to Ceylon in the same capacity. He will have the task of maintaining contact between the Government of Ceylon and the WHO Regional Office for South East Asia for the development and implementation of WHO assistance to the country's health programme. He will also strive to obtain the maximum co-ordination between the work of WHO in Ceylon and that of other international agencies concerned with public health. At present WHO assisted programmes in Ceylon include rural health, environmental sanitation, nursing education, health statistics, physiotherapy and the training of laboratory technicians.

A former Deputy Director General of Health Services in the Government of India, Dr Puri has also served as Secretary of India's Central Council of Health and as a member of the governing body and executive committee of the Indian Council of Medical Research.

Research on iron deficiency anaemia

A preliminary survey is being made of the facilities of centres in which research on iron deficiency anaemia will be carried out under

WHO's programme of international medical research

Dr M M Wintrobe Professor and Head of the Department of Internal Medicine and Director of the Laboratory for Study of Hereditary and Metabolic Diseases University of Utah will conduct the initial survey of centres in Latin America Dr Wintrobe is a leading haematologist and has had extensive experience in clinical and experimental nutrition

Hospital construction and planning

An expert on hospital construction and planning—Mr W F Vetter—is at present visiting a number of countries in Africa to advise governments on their problems in this field This mission was organized by the WHO Regional Office for Africa after inquiry among the governments of Member States Early this year Mr Vetter visited Basutoland the Federation of Rhodesia and Nyasaland Swaziland and Mozambique Since then he has visited Angola and Nigeria and paid a second visit to Mozambique he will subsequently visit Uganda the Seychelles and Zanzibar

A well known Swiss architect Mr Vetter is Secretary General of the International Union of Architects He has carried out several assignments for WHO in the European Eastern Mediterranean and Western Pacific Regions and last year on the recommendation of WHO undertook hospital planning for the Government of Ghana He is a member of the WHO Expert Advisory Panel on Organization of Medical Care

Control of venereal diseases

Dr E J Grin of Yugoslavia has been appointed WHO consultant to the venereal disease control project started in the Sudan several years ago under the auspices of the WHO Regional Office for the Eastern Mediterranean Dr Grin has been a member of the WHO

Advisory Panel on Venereal Infections and Treponematoses and has served as WHO adviser on yaws control in Thailand for two years He has also served as director of the endemic non venereal syphilis eradication programme which was completed in Yugoslavia five years ago

Urbanization survey

Professor G A Canaperia Director of International and Cultural Relations Office of the High Commissioner for Hygiene and Public Health Italy is WHO representative on a United Nations mission which is studying urbanization problems in Athens Cairo and Casablanca The mission will examine the possibility of joint action in this field by the United Nations and specialized agencies As a representative of the Italian Public Health Administration Professor Canaperia has been associated with WHO since its foundation he has served on the WHO Executive Board many times and was its Chairman at the eighteenth and nineteenth sessions (1956-1957)

Headquarters appointment

Dr Maria Pfister Medical Officer Mental Health WHO Headquarters who has been granted a year's study leave will be replaced from September to November 1959 and from May to August 1960 by Professor Tsung yi Lin of China (Taiwan) A graduate of Tokyo and Harvard Universities Professor Lin holds the Chair of Neurology and Psychiatry at Taiwan University Taipei He is a member of the WHO Expert Advisory Panel on Mental Health and has taken part in the work of several WHO study groups and expert committees While at WHO Headquarters he will co-operate in the planning of surveys and inter regional conferences on the epidemiology of mental disorders as well as in the general activities of the Mental Health unit

Review of WHO Publications

Water Supply for Rural Areas and Small Communities by E. G. Wagner and J. N. Lanot. Geneva 1959 (*World Health Organization Monograph Series No. 42*). 337 pages. Price £1 15s £6 75 or Sw fr 20 — French and Spanish editions in preparation.

During the past century the relationship between water, its bacteriological quality and the incidence of certain communicable diseases was first noticed and investigated with the result that in many countries the provision of as abundant a supply as possible of safe treated water became a normal public service. Standards of water quality (see for example the WHO publication *International Standards for Drinking Water*) and criteria for optimum water distribution have since been established but over large areas of the world the application of these standards is often limited by economic considerations. Illness and death from water borne diseases thus tend to occur chiefly in those countries which can least afford the resultant economic loss. The provision of wholesome water for under-developed areas and small communities is an international health problem which demands attention. The World Health Organization therefore invited the authors to undertake the preparation of this monograph which also incorporates the comments of some forty experts in different parts of the world to whom the manuscript was circulated. The opinions it expresses are thus based upon very wide experience and should be of use to public health administrators, medical officers of health, civil and sanitary engineers and sanitarians faced with the task of supplying safe water in circumstances of varying difficulty.

The diseases transmitted through water fall largely among the enteric bacterial infections—typhoid and paratyphoid fevers, bacillary dysentery, cholera—but water plays a part in the epidemiology of amoebiasis and also indirectly in the transmission of such diseases as malaria, filariasis and schistosomiasis. It is moreover sometimes responsible for the transmission of brucellosis, tularaemia, haemorrhagic jaundice and several other protozoal and virus infections. It seems clear that the significant improvements in health accompanying the consistent use of safe water for drinking and for domestic and personal hygiene can be achieved only if treated water is made readily available in the home rather than merely carried to a public faucet. Water systems based on this ideal are of course expensive and often almost impossible of immediate achievement and in under-developed or rural areas a compromise is invariably necessary between economic realities and public health aspirations. This monograph attempts to clarify the various factors to be taken into account in the long range planning and design of such water systems.

Detailed advice is given on the planning of a water supply project ranging from its first conception within the general programme of a central health administration, the balancing of aims and resources, the allocation of money, technical facilities and personnel, the topographical investigations necessary to determine its feasibility, the choice of treatment methods, the detailed engineering design and finally the practical aspects of construction and operation.

A large section of the volume is devoted to a comprehensive discussion of the installation of various types of water supply systems exploiting either ground water or surface water. The former involves the construction

of wells and the use of pumps both of which subjects are dealt with in great detail and profusely illustrated. The utilization of surface water collected in cisterns catchment areas dams etc. is then considered. Its quality is usually less satisfactory than that of ground water so that treatment is almost always necessary. This factor must largely govern the choice between the two basic types of rural water system as the construction and maintenance of a water treatment plant is a complex and costly undertaking and if it is not well run such a plant may merely contribute to the rapid spread of water borne epidemics. The methods of treatment examined are sedimentation filtration aeration corrosion control and chlorination household purification of water is also described in some detail. Water distribution systems for rural areas are essentially similar to those for urban communities, differing mainly in the standards and assumptions upon which engineering designs are based. Suggestions are made on methods and standards of water storage on the selection of pipes and other service connections and on special problems such as the installation of hydropneumatic systems.

Finally the authors discuss the theory and practice of the management of small water supply systems. Specific advice is given on personnel and training (emphasizing the value of short courses in service training programmes and correspondence courses for countries where experienced staff is not immediately available) on administration and finance (in particular ways of circumventing the difficulties involved in collecting water fees in under developed communities) on operation and maintenance and on the elaboration of long range plans for water service. The nine annexes give much useful construction data both textual and illustrative and a brief bibliography indicates the main sources of further information.

The authors hope that this critical examination of the technical and administrative factors contributing to the success of water supply programmes will stimulate their development at the local level in Member States of WHO.

Pharmacopoea Internationalis Editio Prima Supplementum Geneva 1959 xx+224 pages Price £1 5s \$5 or Sw fr 15—Published also in French Spanish edition in preparation

The first edition of the International Pharmacopoeia volumes I and II of which appeared in 1951 and 1955 has just been completed by the publication of a supplement containing a further 94 monographs and 17 appendices.

The monographs include specifications for some hormone preparations antimalarials and antibiotics not given in the earlier volumes for the contrast media acetrizic acid and iopanoic acid and for certain pharmaceutical forms of the antibiotics described in volume II.

As in volumes I and II the appendices contain lists of reagents tables of doses and descriptions of assay methods. In addition they deal with various subjects not covered in the previous volumes—for instance the preparation of buffer and isotonic solutions the determination of pH and of resistivity and the testing of glass containers for injections. They also include a revised list of International Biological Standards and Reference Preparations and a list of so-called authentic chemical substances that is substances needed for reference purposes which can be characterized by physico-chemical methods.

Some amendments to volumes I and II are presented in an annex and finally a detailed index to the whole of the first edition is provided.

A number of preparations introduced into therapeutics in the last few years have been included in the Supplement. It can therefore be said that the complete first edition of the International Pharmacopoeia deals with a large proportion of the new pharmaceutical preparations as well as with most of the classical therapeutic substances and describes many general methods of quality control in addition to presenting tables of dosage.

The International Pharmacopoeia constitutes a collection of recommended specifica-

tions which are not intended to have legal status as such in any country but are offered to serve as references so that national specifications can be established on a similar basis in any country. It is intended to be

of use to all national and other authorities dealing with specifications for pharmaceutical preparations as well as to manufacturing firms and laboratories dealing with the quality control of such products

* * *

The pharmaceutical and medical press on *Pharmacopœa Internationalis* Volumes I and II

- This book is a milestone in human progress

American Journal of the Medical Sciences

- An outstanding achievement

Journal of the Royal Institute of Chemistry

- This outstanding work is undoubtedly the greatest advance towards international unification of terminology, strengths and composition of pharmaceutical substances since the dawn of this era of modern medicine

The Syntex Chemical

- This book should be particularly useful in those countries in which pharmacopœias need revision. It is also likely to be of considerable service in any country that does not have a national compendium of standards and tests for drugs

Journal of the American Medical Association

- It is a work of great simplicity and common sense and must succeed in its purpose

British Journal of Hospital Medicine

- The publication for the first time of an International Pharmacopœia must indeed be regarded as a historic event and a triumph for the committee of international experts who have at last overcome the difficulties of its presentation

The Analyst

- The International Pharmacopœia has been most carefully prepared and produced. It deserves a high measure of success

Topical Diseases Bulletin

- In preparing this work WHO has rendered an invaluable service to Pharmacology all the world over but especially in those countries which have not developed a pharmacopœia of their own. Only in the future will the real measure of its importance be manifest

Journal of the Royal Institute of Public Health and Hygiene

of wells and the use of pumps both of which subjects are dealt with in great detail and profusely illustrated. The utilization of surface water collected in cisterns catchment areas dams etc. is then considered. Its quality is usually less satisfactory than that of ground water so that treatment is almost always necessary. This factor must largely govern the choice between the two basic types of rural water system as the construction and maintenance of a water treatment plant is a complex and costly undertaking and if it is not well run such a plant may merely contribute to the rapid spread of water borne epidemics. The methods of treatment examined are sedimentation filtration aeration corrosion control and chlorination household purification of water is also described in some detail. Water distribution systems for rural areas are essentially similar to those for urban communities differing mainly in the standards and assumptions upon which engineering designs are based. Suggestions are made on methods and standards of water storage on the selection of pipes and other service connections and on special problems such as the installation of hydropneumatic systems.

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WORLD HEALTH ORGANIZATION

TUBERCULOSIS

Introduction

Epidemiological basis of tuberculosis eradication
in an advanced country—*E Groth Petersen,*
Jorgen Knudsen & Erik Wilbek

A concurrent comparison of home and sanato-
rium treatment of pulmonary tuberculosis
in South India—*Tuberculosis Chemotherapy*
Centre, Madras

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HEALTH AND WELFARE OF SEAFARERS IN EUROPE

An article in the November 1959 issue of the WHO Chronicle discussed the problems of the health and welfare of seafarers in the broad aspects. This article is a condensed feature of a conference on the health and welfare of seafarers in Europe held in Maastricht last February by the WHO Regional Office for Europe. The article below is largely on the report of the conference and a paper presented to it by Dr Karl E. Lang, Director-General of Health Services in Norway.

Not enough is known either of the health and welfare problems of the seafaring population or of what is being done to deal with them. Even the exact size of this population is unknown. There are rather more than 33 000 ocean going merchant vessels and the number of officers and crew may be roughly estimated at between 600 000 and 750 000. This number is growing with the constant increase in tonnage. There are also those who work on fishing and whaling vessels and coasters, those on research, telecommunication, control, supervisory and similar vessels and those in the naval forces of the various countries and the gross total is obviously considerable. The seafaring population consists predominantly of males aged between 16 and 65 but no over all data are available on their exact age distribution, their marital and family status and the length of time they stay in their occupation. There is a similarity in outlook and spirit and in the general pattern of behaviour and way of life among seafarers of all nations. We do not know whether this is due to the unique character of their occupation or to selective forces leading individuals of a certain kind to opt for the seafaring life.

Seafarers occupy a key position both in war and in peace. Victory in the two world wars went to the powers which had the largest number of ships and could control the seas. In peace a strike or lock out involving the merchant navy has immediate and widespread repercussions all over the world. In view of the prominent part they play seafarers should

ideally as a class be responsible, alert and well informed, have high social, economic and cultural standards and appreciate the importance of their calling. Often however lack of proper attention to their health and welfare has made them bitter, suspicious and withdrawn, denationalized when they lose their roots in their own country but not internationalized in a positive sense.

It took a long time for the obvious fact to sink in that the seafarer living, working and eating in the same place is in an occupation which moulds his life to a greater extent than almost any other and cannot be subjected to the same health and welfare measures as the population ashore. Much has had to be done nationally and internationally to make his living, working and eating conditions tolerably satisfactory but there is still a long way to go before they are anything like satisfactory enough. The time now seems to be ripe for a more systematic and comprehensive approach which must rest on the foundation of a close collaboration between the countries concerned. The days have gone when the health of seafarers was viewed solely in terms of venereal disease and alcoholism as a group they present a very complex and interesting picture and their health status in general is not as satisfactory as might be expected.

What particular health hazards do they face that people ashore do not normally encounter? The seafarer is exposed to a variety of climatic conditions which may in themselves subject him to great strain indeed he may never become adjusted to

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is nobody and no organization waiting to welcome him. Thus misuse of alcohol is a serious problem among seafarers. The best line of approach to its solution would appear to be to offer the seafarer ashore such cultural, educational and social outlets that he will not be tempted to indulge in alcohol to excess but will look upon it as he would in his own country.

Existing health and welfare services

Generally speaking existing medical and welfare services for the seafarer are not very satisfactory.

Usually there is no doctor aboard ship nor are there likely to be any in the near future except in passenger ships, naval vessels and a few others, mainly of large size. Minor illnesses and accidents are treated by a ship's officer who is not as a rule trained in first aid and who will use the ship's medicine chest which may or may not be satisfactory. More serious illnesses or accidents are treated by medical advice radioed to the ship. Mental or psychosomatic illness is unlikely to be treated properly at sea. Welfare services aboard providing further education, physical exercise and high quality entertainment are little known in merchant vessels.

In foreign ports, particularly the larger ones, first class medical facilities are often available but equally often neither the seafarers nor the ship masters or consular representatives know how to go about finding them. Hence only too frequently the diagnosis and the treatment received by the seafarer are haphazard. There may also be language difficulties and the shortness of the ship's stay in port may mean lack of continuity in treatment. In smaller ports medical facilities may be inadequate or lacking. The special facilities for the treatment of venereal diseases provided under the Brussels Agreement of 1974 are usually better than ordinary medical facilities but in spite of advances in treatment these diseases still present a great problem among seafarers. Welfare services have improved in recent years but are still far from satisfactory.

In home ports seafarers usually enjoy the same medical and welfare facilities as their fellow-countrymen. Special services for seafarers are more and more being introduced especially since the end of the Second World War.

Over the past twenty years or so the social and economic conditions of seafarers have been greatly improved. National governments, trade unions and trade union federations, shipowners and shipping federations and international organizations have all helped to bring this about. Although it is primarily concerned with such matters as labour management relations, wages and hours, the International Labour Office (ILO) early perceived the close relationship between social and economic conditions and welfare and health and has done much to improve them. WHO is naturally interested in the seafarer's health and a special Joint ILO/WHO Committee on Hygiene of Seafarers has been set up. Its work was recently described in the *Chronicle*.² In 1958 a new consultative and advisory body, the Inter-governmental Maritime Consultative Organization (IMCO), was established with its headquarters in London. It may be expected to play an increasing part in conjunction with WHO and ILO in promoting the health and welfare of seafarers.

Many governments have introduced or improved sickness and injury schemes and set up special health services for seafarers not only in their own countries but also abroad. Bold and imaginative programmes have been carried out by a variety of agencies on board ships and in ports. On board ship clubs, groups and committees have been established, sport has been organized and competitions arranged, facilities for the study of languages, seamanship, the history and geography of other countries etc. have been made available and libraries, newspaper services and films have all been introduced.

The most pressing welfare problem in ports is to provide good and inexpensive hotel accommodation for seafarers. This should

them He does not like the landsman live in a relatively unchanging environment exposed on the whole to the same diseases Every new member of the crew every passenger every port visited are potentially new sources of infection and the intimate contact with his fellows on board ship increases the risk of his acquiring infection The exposure risk is the greater because the seafarer partly because of his occupation partly by tradition moves in circles ashore with a high morbidity rate Among the communicable diseases to which he is exposed tuberculosis merits special attention because of the threat it constitutes to the health of the crew in the confined area of a ship It is indeed so serious a threat that several of the countries most advanced in organizing health services for their seafarers have found it advisable to introduce compulsory examination for tuberculosis not only of all seafarers signing on but also of the entire crew at regular intervals

The more manifest deficiency diseases have mostly disappeared among seafarers now that more attention is being paid to their diet But in the rather dull routine of life at sea meals tend to play too dominant a part and the shift system often makes them irregular As a result peptic ulcer gastritis constipation and obesity are common

The loading and unloading of a variety of cargoes may have to be done very quickly by methods ranging from the primitive to the highly mechanized There may be language difficulties leading to misunderstandings and incoordination of movements If there is a rapid turnover of the crew there may not develop among the seafarers working together a knowledge of their companions methods of work strength and ability And emergencies may require sudden action with unfamiliar tools Injuries are accordingly common In general too strange though it may seem seafarers do not get regular physical exercise Periods of relative inactivity are followed by periods of heavy muscular effort so that hernias lesions of the muscles tendons and intervertebral discs and overstrain of the heart and vascular system may occur

The most striking of the differences between the health hazards of seafarers and of people ashore are to be found in mental health The seafarer is absent from his familiar home environment and from his kith and kin for irregular and often lengthy periods He thus is denied stable human relationships and on his return home he must readjust himself to his wife and children or to his sweetheart who like him have had to accustom themselves to his absence and to new impressions gained while he was away He may return home a stranger after a long voyage and leave it still a stranger having failed to achieve a satisfactory adjustment One or two painful experiences of this kind may destroy his basic feeling of security and his trust in the permanence of fundamental human relationships

At sea too since crews are always changing he has little opportunity of establishing stable friendships or among fluctuating human relationships he may become dangerously over dependent upon one At sea the environment is not only artificial but is wholly masculine as well so that he cannot satisfy his sexual requirements normally and healthily either from the purely physical or from the mental and social point of view In port he can satisfy the physical side but only at the expense of the mental side so that as far as sex is concerned the foundations of a split personality are laid

These factors may act in concert with the limited living space the daily routine and the feeling of loneliness so common in seafarers on board ship and contribute to a syndrome that has been termed "seafarers depression" The symptoms of this condition naturally vary with the individual patient but they may include a feeling of inferiority unmotivated suspicion and jealousy lack of initiative and very often insomnia

When he sets foot in port the seafarer may thus be emotionally and mentally frustrated and bursting with the tensions aggressions and conflicts of life at sea which his circumstances on board compel him to repress He seeks an outlet and often finds it in an excessive consumption of alcohol particularly if the port is strange the language unknown the people unfamiliar and there

INTERNATIONAL CONTROL OF NARCOTIC DRUGS

Since the time of the first international conference on the control of narcotics which met in 1909 in Shanghai there has been universal recognition of the importance of preventing the abuse of narcotic drugs. Before the Second World War the League of Nations undertook the necessary measures for international control of illicit traffic in opium, morphine and other drugs used by addicts. Through its Health Committee the League also dealt with the medical problems involved in such control. When the League of Nations was dissolved its functions were conferred upon two international organizations: the policy making and administrative functions were transferred to the United Nations Organization whereas the specifically medical aspects came within the purview of the World Health Organization.

Present organization of international control

At the present time the principal bodies responsible for the international control of narcotic drugs are three special organs of the United Nations, namely the Commission on Narcotic Drugs, the Permanent Central Opium Board and the Drug Supervisory Body, while the World Health Organization is associated with them in a mainly advisory capacity. The four bodies work in close collaboration and their respective functions are clearly defined so as to ensure that their co-operation is as effective as possible.

The *Commission on Narcotic Drugs* is an organ of the Economic and Social Council. It consists of 12 permanent and 3 temporary members, the latter being appointed by the Council. Its function is to advise the Council on matters relating to the application of the conventions and agreements in force in this field and within the limits of its advisory capacity to determine the procedures to be adopted in all questions relating to the international control of drugs.

The *Permanent Central Opium Board* is composed of 8 experts appointed by the Economic and Social Council. Its responsibilities include supervising the licit movement of narcotic drugs and deciding whether certain countries are accumulating excessive quantities of a drug or are liable to become centres of illicit traffic. It bases decisions in this respect on statistical information obtained from quarterly and annual reports transmitted to it by all countries which are parties to the International Conventions of 1925 and 1931 on narcotic drugs.¹

The *Drug Supervisory Body* was established to determine as accurately as possible the needs of each country on the basis of estimates furnished by governments or failing these by the Supervisory Body itself. These estimates are then used by the Permanent Central Opium Board to enforce import and manufacture limits. The Supervisory Body consists of 4 members: 2 appointed by the World Health Organization, 1 by the United Nations Commission on Narcotic Drugs and the other by the Permanent Central Opium Board.

The *World Health Organization* advises on the medical aspects of drug addiction and addiction producing drugs. It is empowered to decide whether a newly discovered product is liable to produce addiction and should therefore be subject to international control. The Organization takes such decisions on the advice of an Expert Committee on Addiction Producing Drugs, whose activities include the examination of drugs suspected of having addiction producing properties. Since its inception in 1946 during the last ten years the Committee has examined 73 drugs and preparations, 55 of which were found to represent a danger to public health. The proceedings of the Committee accompanied

¹ Convened on 19 February 1925 as amended by the Protocol of 11 December 1946. Convened on 13 July 1931 for Limiting the Manufacture and Regulation of the Distribution of Narcotic Drugs, as amended by the Protocol of 11 December 1946.

preferably also provide a basis for other welfare activities under the guidance of one or more welfare officers—sightseeing tours games social gatherings and help with shopping

Improvement of existing services

Lectures on the following subjects were given at the conference the health and welfare of seafarers on board ship medical facilities ashore dental health problems mental health problems of seamen in the merchant marine social work among seafarers of the French merchant marine rehabilitation health centres for seafarers in the light of national experience

In the last of these lectures the chief points of criticism levelled against existing health and welfare services for seafarers were summarized. The medical practitioners dealing with foreign seafarers in ports are of very unequal quality. Seafarers are some times sent to hospital in a haphazard way. Preventive measures are inadequate in that no single authority—neither the port health services (because the seafarers are not their nationals) nor the ship's officer or consulate (because they are in a foreign country and have no legal basis for action)—feels that it is fully responsible for them. The result is that the seafarer often falls between two stools. The approach to mental illness in the seafarer is sometimes out of line with the modern approach. In some ports the ethical quality of the medical service is at fault. Finally shipping companies complain that the cost of medical care is disproportionately high and incommensurate with the quality of medical care provided.

What could be done to remedy this state of affairs? General health services open to seafarers of every nationality could be provided in ports. The scope of existing services for example those set up under the Brussels Agreement could be widened to include other diseases and health problems. Alternatively two or more countries could assist each other by establishing health services for their sailors in foreign ports.

This has been done by Norway which has declared itself willing to accept Danish or Swedish sailors for treatment at health centres it has set up in New York London Liverpool and Antwerp provided that Sweden establishes similar centres elsewhere which will accept Norwegian sailors on a reciprocal basis. Yet another alternative would be an international agreement on the lines of the Brussels Agreement. This would have the great advantage that all seafaring nations could benefit from the service right from the beginning. It would have the disadvantage that since the procedure of drafting an international agreement and having it ratified by a sufficient number of governments is liable to be extremely lengthy the service could not be inaugurated for an indefinite period. Perhaps the shipping and seafarers organizations could arrange among themselves to establish the service on an international basis.

Whatever the way in which health centres for seafarers are established there are certain requirements that they should meet. For one thing they should be conveniently located. They should have modern equipment for diagnosis treatment and minor surgery or if not be able to make use of such equipment elsewhere with the minimum delay and fuss. The basic staff should consist of general practitioners with special experience in the conditions and the way of life of seafarers but if the work so requires specialists in particular psychiatrists should also do full time or part time duties at the centres. Each centre should be prepared on request to send doctors on board ships to try to solve medical problems that have arisen without delaying the ships. It should regard itself as a medical clearing house in relation to immigration authorities consulates hospitals etc. And it should be staffed in such a way as to reduce language difficulties to the minimum. The creation of health centres like these might mean that data on the health problems of seafarers so largely lacking would become available and in their turn provide a stepping stone to further advances in dealing with these problems.

of which 23 were not opium derivatives. This increase in the number of drugs has of course meant an increase in the work of the bodies concerned but there have also been complications owing to the fact that the new drugs often have long scientific names which lend themselves to various interpretations. The task would have been almost impossible without the help of WHO which has perfected a procedure for rapidly giving international non proprietary names to new drugs with complicated scientific names.

The changes in the content of the estimates during the period in question are also extremely interesting. Diacetylmorphine (heroin) provides a striking example. In 1934 the requirements were 1558 kg and in 1959 they had dropped to 74 kg. WHO was largely instrumental in bringing about this change. The Sixth World Health Assembly recommended on the proposal of the Expert Committee on Addiction Producing Drugs that action should be taken to try to convince physicians and governments that this particularly dangerous drug was not irreplaceable in medical practice and that its production and importation could be prohibited. Another

interesting example is the decrease in the consumption of morphine which in 1934 was estimated at 9370 kg whereas the provision for 1959 was 5066 kg. On the other hand the estimates for conversion products of morphine are constantly rising especially with respect to less dangerous substances such as codeine and ethylmorphine. The greater consumption of these products may be due to the increase in the world's population, the rising standards of living, the development of medical practice and the extension of medico-social services.

It is also interesting to note that governments are becoming less and less inclined to present exaggerated estimates of their requirements. This shows that there is an increasing desire to guard against any risk of encouraging illicit traffic or drug addiction—both of which may result from the acquisition of excessive quantities.

It is clear from the foregoing that although a great deal still remains to be done, there is an active and effective international organization for the control of addiction producing drugs and that it is receiving increasing support from all the countries concerned.

THE INTERNATIONAL PYROGEN REFERENCE PREPARATION

Almost a century ago it was noted that the injection of sterile aqueous solutions sometimes caused serious febrile reactions in patients. Billroth drew attention to this fact in an article published in 1865.

In 1923 Florence Seibert discovered that these reactions were due to the presence in distilled water of filtrable and thermostable substances which she called pyrogens. Since then pyrogens have been found in drinking and distilled water, on the glass of ampoules and receptacles and in antibiotic preparations. Pyrogens are formed in many micro-organisms including the ordinary bacteria in the atmosphere, mildew and a number of contaminants which develop in a

laboratory atmosphere polluted by gases, vapours or droplets of chemical substances in solution. Many widely differing micro-organisms produce pyrogens: the *A. otobacter* of the soil, plague bacilli, diphtheria bacilli, *B. subtilis* and *Salmonella*. Although they are found in gram positive organisms they seem to occur more frequently in gram negative bacilli and specifically in their somatic antigens. These antigens behave like toxins and provoke temperature disorders—hypothermia in rats, mice and guinea pigs and hyperthermia in the rabbit and in man.

Pyrogens have also been observed to induce haemorrhage in implanted sarcomas.

by statements on special problems raised by drug addiction have been published in nine reports. It also advises on products which although not addiction producing drugs can readily be converted into them. The same Committee has also given definitions of drug addiction and drug habituation taking into account pharmacological, psychological and public health aspects. These definitions have found world wide acceptance. Recently the range of drugs which need continual survey has been increased by the inclusion of hypnotic and tranquillizing as well as stimulating agents although these are not addicting in the strict sense of the definition.

Furthermore the World Health Organization has started to take an active interest in the treatment of drug addicts. In 1956 a Study Group on the Treatment and Care of Drug Addicts² studied in particular the medical features of drug addiction caused by opium, opiates, morphine like synthetic drugs and cannabis and outlined general principles as well as recommending rational methods of treatment and rehabilitation.

The chewing of coca leaves which is so widespread in many parts of Latin America and the increasing abuse of cannabis are other important problems dealt with by the World Health Organization which has decided that both habits represent a considerable danger to public health and has suggested the form which international control of these types of addiction should take.

Introduction of new addiction producing substances

The whole problem is complicated by the introduction of new therapeutic substances which may have addiction producing properties and above all the continual discovery of new narcotics mainly synthetic which are submitted for international control every year. WHO follows developments in this field very closely and at the request of the Economic and Social Council has undertaken studies on the chemical structure of

synthetic substances with morphine like effects the relationship between their chemical structure and their analgesic action and the relationship between the latter and their addiction liability. Furthermore the Organization has studied the therapeutic properties and side effects — especially the addiction producing properties — of 30 drugs of practical importance which have been put on the market as substitutes for morphine and codeine³.

It is often difficult in the initial period of use of a new drug to determine the real requirements with any accuracy since the therapeutic needs are not well known and it is in the first few years following the introduction of such drugs that the Supervisory Body must exercise the greatest vigilance.

Very few governments are ready straight away to reduce their estimated requirements in drugs which the new ones are intended to replace—with the result that there may be an unjustifiable over all increase in the estimated requirements both for the old and for the new drugs.

Estimate of world requirements in narcotic drugs

The Supervisory Body estimates each year's requirements on the basis of data for the previous year sent in by the respective countries. In this way it is possible to keep a check on international trade in narcotic drugs. The Supervisory Body first met in 1933 and a review of its first twenty five years work was made in 1958.

The statement of estimates for 1934 covered 182 countries and territories for 54 of which estimates had been established by the Supervisory Body itself. In 1959 on the other hand only 7 out of 167 countries and territories failed to supply the necessary information themselves. This is eloquent proof of the progress made.

The estimates for 1934 referred to 15 addiction producing drugs all derived from opium whereas in 1959 there were 43 drugs

B R Wld Hlth Org 1954 10 1003 1959 13 937 1966
14 353 1957 17 569

cells of *Shigella dysenteriae* were extracted with diethylene glycol and the extract subjected to fractional precipitation. After removal of the phospholipid component the resulting polysaccharide protein complex was fractionated by high speed centrifuging and the fraction sedimenting at between 25 000 and 105 000 g was isolated. The material contained 4.5-4.6% nitrogen and 0.8-0.85% phosphorus and was free from detectable impurities as shown by the usual tests. A polysaccharide dissociated from the lipoprotein at alkaline pH values. The 50 lethal dose (LD_{50}) of this pyrogen is 80 μ g in the mouse in the rabbit intravenous injection of 1 μ g induces the formation of

Shigella dysenteriae agglutinins only 0.003 μ g is needed to raise the temperature of the rabbit.

This material is now at the disposal of research laboratories. It is freeze-dried in ampoules containing 2 mg of the dry substance which dissolves completely if left for one to two hours in water or saline solution.

It is hoped that the International Pyrogen Reference Preparation will be used extensively by research workers and that ultimately it will be possible on the basis of the various results obtained to develop a satisfactory test for pyrogen activity of injectable preparations in terms of the International Reference Preparation.

International help in Morocco disaster

Ten thousand Moroccans in the Meknes region who were recently poisoned by mineral oil mixed with the cooking oil are to have international help for their treatment and rehabilitation.

On 18 November at WHO Headquarters Geneva, Dr Benhama, the Secretary-General of the Moroccan Health Ministry met with representatives of the WHO Regional Office for Europe, UNICEF, the United Nations Technical Assistance Bureau, the League of Red Cross Societies and the International Labour Office in order to discuss practical aid to the Moroccan Government in this tragic situation. The victims are paralysed to a greater or lesser extent. The situation is all the more serious since Morocco with a population of some 10 million has only 17 000 hospital beds. All the blind victims are therefore being given priority for the available beds.

The meeting recognized that both medical treatment and rehabilitation services were urgently needed. A special hospital should be established at Meknes, staffed by medical specialists, teachers, specialists in rehabilitation and health assistants. This hospital should work in liaison with 17 treatment centres in different parts of the affected region. Each centre should aim at treating 400 victims and would require a staff of physiotherapists and health assistants. These centres could be housed in tents or temporary buildings with mobile kitchens. Each would need a large quantity of equipment such as crutches, baths, solaria, halli-rs, special skates and other rehabilitation apparatus.

The Moroccan Government requested the help of the WHO Regional Office for Europe on 23 September when the first cases of poisoning appeared. The Regional Office immediately sent two scientific advisers, Dr Honoré Smith and Dr J. M. K. Spalding (United Kingdom). Working with Moroccan doctors these experts traced the cause of the outbreak to poisoning by mineral oil (tri-ortho-cresyl phosphate) which was found mixed into the cooking oil used throughout the Meknes region. Later the Regional Office sent Professor Leroy of the University of Rennes (France) to Morocco to estimate what measures would be needed for the treatment and rehabilitation of the victims. His report served as a basis for the relief discussions in Geneva.

as well as leukopenia and hyperglycaemia. These symptoms are related to the presence of endotoxins—which may exist in saprophytic and parasitic as well as in autotrophic bacteria.

Pyrogens and pharmacopoeias

For many patients the symptoms caused by pyrogens are no more than disagreeable but they may be very dangerous for persons who are already seriously ill. Pyrogens must therefore be excluded from injectable preparations—from the water used as the vehicle from the inside surface of the ampoules and from therapeutic substances such as antibiotics which may contain them. Pyrogens are thermostable however they resist the distillation temperature of water and it is therefore useless to adopt the method of successive distillations in the hope of destroying them they even survive after autoclaving at 120 C and after exposure to dry heat at 160 170 C. To inactivate them a temperature of at least 250 C is required for 30 minutes. Filtering through a Seitz filter (with frequent change of filter surface) and treatment with activated charcoal or with peroxide of hydrogen are other methods.

Specifications relating to pyrogens are now included in certain pharmacopœias owing to the general use of injectable preparations liable to contain them and the consequent risk to patients. In the United States the "Amendments to the Pharmacopœia" in 1932 contained a test for the detection of pyrogens in pharmaceutical preparations. The *Pharmacopœia Internationalis* also includes a pyrogen test in the form of a biological assay on rabbits. In this test the substance is injected into the ear veins of selected rabbits and their rectal temperature is taken one two and three hours after injection. "The test is considered positive if 4 or more of the 8 rabbits show an individual temperature rise of 0.6° or if the sum of the 8 temperature rises exceeds 3.7°."

Need for a reference preparation

There is still uncertainty about human sensitivity to pyrogens as compared with that of rabbits. Some workers have declared that man is definitely more sensitive while others affirm the contrary—and the question is not settled. What are the variations in individual sensitivity in one and the same rabbit-colony and among different colonies? What is the dose response curve in man? Is it the same with respect to all pyrogens whatever their origin? If not, where does the difference lie? Are some pyrogens equally active in man and in the rabbit? These are all questions to which an answer has to be found and this will only be possible if workers can use a standard reference preparation and thus obtain comparable results. The need for an international reference preparation was therefore imperative. In 1950 the WHO Expert Committee on Biological Standardization discussed this question and subsequently under the auspices of WHO and through the National Institute for Medical Research in London a number of laboratories studied two pyrogens—one an extract of *Proteus vulgaris* and the other a purified lipopolysaccharide prepared from *Serratia marcescens*. The findings were not conclusive and at later meetings of the Committee it was proposed that a bacterial pyrogen preparation which had been very extensively studied from the chemical and biological angles whose method of purification was fairly precise and which was easily reproducible should be adopted as the reference preparation. The preparation selected was a highly purified O somatic antigen of *Shigella dysenteriae*.²

The International Reference Preparation

The newly established International Pyrogen Reference Preparation is described in a recent number of the *Bulletin of the World Health Organization*.² The acetone dried

World Health Organization (1955) *Pharmaceuticals*
 International Pharmaceutical General Vol 12, p 284

D vles D A L Morgan W T J & Mosim W (1954)
Blach m J 56 572

Humphrey J H & Bingham D R (1959) *B N W J Fish*
Orig 20 1 41

between one census and the next. For all these reasons an analytical study of the mortality data has sometimes been extremely difficult. Certain general trends in mortality have been evident, however.

There were periods when the number of registered deaths increased to an abnormal extent, such were the years 1904-1908 and again 1914-1917. Except for these periods the death rate declined during the century, being almost halved in some countries. This trend was masked in places by the ageing of the population, for the greatest improvement was in infant and child mortality, though there was a marked decline also in the death rates for some middle-aged groups. The result was a higher proportion of people of 60 years of age and over. It became evident that unless new and effective therapeutic agents were discovered and new methods of treatment evolved to combat or retard diseases of old age, there was no possibility of a substantial permanent decrease in the general death rates for the countries which already had a large proportion of old people in their populations.

The expectation of life was increased, the gains made being chiefly concentrated in childhood and early adulthood, and being smaller in countries such as England, France and Sweden where the expectation of life was already high. The maximum gains were at birth, reflecting the great strides made in reducing infant mortality in all the countries of Europe.

The fall in the mortality of pre-school children was also spectacular, the rates in 1950 being less than 30% of the corresponding rates at the beginning of the century. The specific death rates for the other age groups up to 45 or 50 years were reduced in most countries by roughly half or more. But only small gains were registered for older age groups. The minimum specific death rates recorded in all countries were for the age group 10-14 years. The ratio of male to female mortality almost universally exceeded unity for all ages combined (Sweden being

the one exception), male babies being more liable to die than female babies. By about 1947 in 13 Western European countries with a total population of about 203 million there were more than 1,750,000 fewer deaths per year among persons of all ages than would have been expected if the 1900 level of the death rate had remained unchanged.

Mortality could be viewed during the half-century in terms of a selected group of infectious diseases: the typhoid and paratyphoid fevers, scarlet fever, whooping cough, diphtheria, measles, malaria, smallpox and typhus. Mortality from typhoid and paratyphoid fevers declined in practically all European countries, on the whole in a pronounced and steady fashion in one group which included Belgium, England and Wales, the Netherlands, Sweden and Switzerland, far less markedly in a second group which included Italy and Spain. The decline was generally attributed to improvements in sanitary conditions through better water supplies, the installation of sewerage systems, greater attention to the hygiene of milk and other foods, and better plumbing and housing. Other factors were better medical care, more hospital facilities, earlier notification of suspected cases, prompter measures by public health authorities on receiving notifications, improvement in the education of the public, greater awareness of the dangers of infection, and perhaps antityphoid inoculations (though the part played by inoculation is difficult to assess).

With scarlet fever there was no definite decline in mortality until about 1920. Thereafter it became appreciable, although there were marked fluctuations in some countries, and at the end of the half-century mortality was of the order of between 0.1 and 0.2 per 100,000 inhabitants, having been more than 5 per 100,000 for most European countries at the beginning of the period. The two explanations most frequently advanced for the uniform decline were a change in the virulence of the causative organism and a shift in the incidence of the disease, which now tended to attack older children and adults rather than the younger children among whom it had previously been most frequent.

FRANCE	1904	1950	1911	1917	1950	1950	1950
E. Europe	36	36	36	36	36	36	36
264	36	36	36	36	36	36	36

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958*

6 International mortality statistics

General mortality

A general survey of the vast quantity of material stored in the annual and monthly statistical publications of WHO is certainly beyond the scope of the present review. It is also doubtful whether it would be fruitful as the data clearly vary widely in completeness, accuracy and comparability. Nevertheless there is a use for such data in studies with a specific purpose, e.g. on variations of and trends in mortality in selected countries or regions or on mortality by cause.

Mortality statistics from various countries and territories are received by WHO directly or through the United Nations Statistical Office. This material is regularly tabulated and published in the *Annual Epidemiological and Vital Statistics* and the monthly *Epidemiological and Vital Statistics Report*.

The annual volumes have generally contained some 60 tables, but there were 74 tables in the 1958 volume which gave data for 1955. The tables in these volumes are grouped as follows: general vital statistics of selected countries and certain large cities; causes of death according to age and sex for 30 to 40 countries; deaths and death rates from selected causes by age and sex; causes of and deaths from notifiable diseases for countries and territories with seasonal distribution.

Though limited in scope, these annual volumes are growing in importance as sources of basic data extending over many years. They provide demographers, statisticians, epidemiologists, sociologists and public health workers with reference material for enquiries into world or regional mortality phenomena. They also serve as a stimulus to many administrations to remedy lacunae

irregularities and inaccuracies in their own statistics.

The monthly *Epidemiological and Vital Statistics Report* contains current data on general mortality, infant mortality, notifiable diseases, and also special tables on the occurrence of diseases in certain selected countries and large cities.

The contents of these reports may be illustrated by a recent tabulation of general mortality in the *Epidemiological and Vital Statistics Report*. It gives available death rates per 1000 population for countries throughout the world for which statistics are available, noting where the data are incomplete or approximate, and provides figures for the years 1936-38, 1947-49, 1950-52, 1953-55, 1956-1957 and the quarters of 1956-1957 and 1958. Other tables show the total number of deaths and death rates per 1 000 000 population by sex since 1950; the number of deaths by sex and age group since 1950; the 1954-1956 average of specific death rates per 1 000 000 population by sex and age group; the number of deaths by sex and by age in 1954-1956; and the distribution of deaths from various causes in 1954-1956 using the International Classification.

The mortality statistics available in the most complete form for the largest population and longest time are those for Europe. In Europe, the period since 1900 has however been characterized by two world wars which, in addition to causing a loss of population and migrations, brought about important changes in territorial boundaries and under registration of deaths. Moreover, the national censuses have also differed in value. The administration of statistics services has varied in efficiency from country to country, in some the basic accuracy of population data may even have changed.

* For the list of publications of the WHO, see the 1959-1967
214 253 378 417

Isles and Scandinavia infant mortality rates in European countries were over 150 per 1000 live births being 250 or more per 1000 in Austria Hungary southern Germany and Russia. In 1912 when there were rates below 100 per 1000 in the British Isles the Netherlands Scandinavia and Switzerland they were still over 180 in Austria Hungary Romania and Russia. In 1932 the area of excessive infant mortality in Europe was confined to Hungary and Romania. In 1946 on the other hand among countries throughout the world which published statistics on the subject only four had rates of 160 or over while none had rates over 185.

Just before the Second World War infant mortality rates of under 50 per 1000 live births were to be found in Australia Scandinavia Switzerland the Netherlands and New Zealand. This group of countries with a very low infant mortality rate was joined immediately after the war by Canada the United Kingdom and the United States while in Australia New Zealand and Sweden the rate had by then fallen to below 30 per 1000.

The immediate effect of the Second World War on infant mortality varied from country to country. In Scandinavia and the United Kingdom it was practically nil indeed Sweden the United Kingdom and the United States experienced their most spectacular fall in infant mortality after 1941. In spite of the hardships it suffered Finland had a rate above its pre war level only in 1940 while Iceland and Norway remained below 40 per 1000 except for one year. In France on the other hand the rate rose from 65 per 1000 live births in 1937 1939 to 91 in 1940 and 108 in 1945. In Germany where the rate had fallen from 145 per 1000 in 1919 to 60 in 1938 1939 it rose slowly throughout the war and in the British Zone of Occupation it was 105 per 1000 in 1946. In Austria where it had been 70 per 1000 in 1941 it was 167 per 1000 in 1945 but it was back to 81 in 1946.

A general downward trend in infant mortality in some cases momentarily interrupted by the war was also observable elsewhere. In Egypt the rate which had been 274 per 1000 in 1921 1925 fell to 198 in 1939 rose to 215 in 1943 but fell again to

185 per 1000 in 1946. In Ceylon the 1931 1935 rate of 182 per 1000 fell to 140 per 1000 in 1945. In India the rate was 182 per 1000 in 1921 1925 156 in 1939 169 in 1944. In Venezuela it had been over 150 in most years up to 1934 but it fell to 99 in 1945 and in Argentina where it had been 99 in 1935 1939 it was 81 in 1943 1945.

In most countries immediately after the war therefore the infant mortality rate in spite of the ravages of the war became as low as it had ever been representing constantly increasing control over the hazards surrounding infant life.

Studies appearing in the *Epidemiological and Vital Statistics Report* in 1950⁶ 1951⁷ and 1952⁸ showed that in most European countries the limits to which the more easily preventable infant deaths could be reduced were being reached with rates falling to 30 deaths and less per 1000 live births. This was also the position in certain other countries particularly Australia Canada New Zealand and the United States. Other countries which made returns also generally showed descending rates.

For reasons of brevity reference has been made only to total infant mortality. Data on the age distribution of infant deaths however provide a valuable field of study and have shown that the reduction of neonatal mortality depends mainly on prenatal care and good obstetrics and goes hand in hand with reduction of maternal mortality. The reduction of later infant mortality (over one month) depends largely on the control of environmental factors and correct feeding. The institution of health centres and improvement in general public health work have contributed to a more rapid decrease in later infant mortality than in mortality in the first month of life.

Accident mortality

Article 2 of WHO's Constitution stipulates that in order to achieve WHO's objectives one of the functions of the Organization shall

PERCIVAL, M. (1950) *Epidemiol. & Stat. Rep.* 3, 13.
PERCIVAL, M. (1951) *Epidemiol. & Stat. Rep.* 4, 43.
PERCIVAL, M. (1952) *Epidemiol. & Stat. Rep.* 5, 79.

Whooping cough mortality also declined with remarkable uniformity throughout the period. Except for better medical and nursing care generally and the use of modern therapeutic agents in combating respiratory complications nothing specific had been done from a public health point of view to account significantly for this considerable decrease.

Mortality from diphtheria decreased substantially during the half-century. While the introduction of antitoxin could be held to be partially responsible for the decrease in the earlier part of the period it was difficult to ascribe full responsibility to it. Preventive immunization had reduced mortality to practically nil wherever it was practised on a sufficiently high proportion of children of pre-school and school age.

There was a conspicuous reduction in the mortality from measles. There does not seem to have been any great change in morbidity but the pattern of distribution may have shifted so that more older children and fewer babies and younger children were affected. Less overcrowding through improved housing may have helped. Administration of convalescent or adult serum and the use of gamma globulin were not carried out on a sufficient scale to have had any considerable effect but this did not apply to the use of sulfa drugs and antibiotics which controlled mortality from the more fatal complications.

Malaria declined also as the result of improved malaria prophylaxis and of progress in the treatment of patients. DDT and other residual insecticides helped bring about a striking decrease in mortality from this disease towards the end of the period.

Widespread and sustained vaccination stimulated by the two world wars was probably responsible for the great decline in smallpox mortality.

Typhus is a disease closely associated with war, famine, overcrowding and insanitary conditions in general. Not surprisingly therefore there were major epidemics during and immediately after the First World War in Poland, Romania, Russia and Serbia; the number of cases in the European part

of the USSR from 1918 to 1921 was estimated at no less than 25 million.² Typhus mortality went up again during the Second World War in central and eastern Europe but not on any comparable scale. The advent of DDT obviously affected its incidence during the closing months and the aftermath of the conflict.

Mortality from all the diseases considered has thus greatly decreased; in some cases very substantially. It is interesting to observe that the rate of decrease in the mortality from several of these diseases has been remarkably similar in various western European countries which differ and have differed a great deal in some of the public health and medical practices usually considered as influencing the behaviour of infectious diseases.

Special studies

Many tables and studies have been based in recent years on the mortality data collected internationally. However we shall deal here with only two subjects which exemplify the development of international statistics and their utilization: the infant mortality and accident mortality.

Infant mortality

Tables of infant and neonatal deaths per 1000 live births are published periodically in the *Epidemiological and Vital Statistics Report*³ and in *Annual Epidemiological and Vital Statistics*. They cover the whole world and in a recent Report are given for the years 1936-38, 1947-49, 1950-52, 1953-55, 1956, 1957 and the quarters of 1956, 1957 and 1958. Separate sections are devoted to infant and neonatal deaths.

Infant mortality had started to decline in Europe by about the turn of the century and in most other countries of the world a little later.⁴ In 1876-1880 except in the British

2. *Id.* 4 Y (1943) B II 1114 O 8 (L. N.) 10 1
Epid. m. 1 15 1 R p 19 D 3 1 6 1951 4 76 195
 5 53 1957 10 7 3 1958 11 9
 3. *Stout* A. (1945) *Epidem.* 1 15 1 R p 1 111

myelitis to ether Statistical studies of "total life or working life" lost through death from various causes show the great economic effect of accident mortality on a nation's productivity in 1945 in the United States for example accidents replaced heart diseases as the cause of death responsible for the greatest number of working years lost

In all of 12 selected countries throughout the world except Ceylon the accident death rate between the ages of 1 and 19 in 1951-53 was at least twice as much for males as for females and in Australia Germany and Sweden it was about three times as much. In the majority of these countries motor vehicle accidents were responsible for the largest share of the deaths but in France and Japan accidental drowning occupied the first position. Deaths from fire and explosion and deaths caused by hot substances occurred much more frequently among females particularly in Ceylon.

In 8 of the 12 countries a study of trends in mortality revealed that the specific death rate between the ages of 1 and 19 while remaining practically unchanged in Australia between 1931 and 1951 decreased during the same period in other countries—by about 15% in Switzerland and by between 25% and 30% in Italy the Netherlands and the United States. If the relative importance of accidental deaths in relation to total deaths is studied however there is a noticeable increase which can be ascribed largely to the more rapid reduction in deaths from other causes. A clear trend towards an increase in deaths from motor vehicle accidents is discernible especially in Australia Canada and Sweden. The decline in the death rate from all accidents is due to the fact that the increasing death rate from motor vehicle accidents is more than compensated for by the decline in the death rate from other accidental causes.

A WHO Advisory Group on Prevention of Accidents in Childhood met in 1956 and devoted much of its agenda to the statistical aspect of accidents for as its report said

"Fact finding is basic to the development of accident prevention programmes"

The Group held the view that data on accidents should contain more information regarding age cause and sex and should be made available quickly as they lost much of their value for the preparation of programmes for prevention and for community education when out of date. In other words routine production of current figures inaccurate as they might be in detail helped greatly in prevention. As in the case of diseases affecting a community the occurrence of accidents in a given population involves important but at present ill understood relationships between the host the agent and the environment. In the opinion of the Advisory Group the epidemiological method offers a scientific approach to the study of accidents and accident prevention. An explanation of causes can be sought in each case through the interaction of the host—the child at risk the agent—the effective cause of the event and the environment—the chain of external circumstances culminating in the event. Whereas from the strictly medical point of view the injured child is the primary concern the epidemiological standpoint requires careful determination not only of the number of events of a certain character which occur in a given category or group of the population but of the time the manner and the place of occurrence and the relation of these events to the population at risk. Hence the importance of careful statistical data on accidents. The Advisory Group considered however that the international use of mortality figures was limited and that the figures were of greater value locally.

The work of the Group was pursued in a more representative seminar convened by the WHO Regional Office for Europe at Spa, Belgium in July 1958. Before the seminar a consultant visited a number of countries in Europe securing further information by means of a questionnaire on the status and extent of accident prevention work. Although the main topics discussed were education and publicity administrative and legal aspects

Dickson, F. G. & W. L. (1941) *Accident Research, American Medical Association Bulletin* 64

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be to promote in co operation with other specialized agencies where necessary the prevention of accidental injuries

The importance of accident mortality has increased in recent years. Whereas general mortality has steadily decreased in many parts of the world the death rate due to accidents remains high and for many types of accident has gone up. In some countries accidents among certain groups have become the chief cause of death in childhood and adolescence killing greater numbers than all other causes combined. The first WHO International Conference of National Committees on Vital and Health Statistics in 1953 accordingly recommended that WHO continue or initiate statistical studies on the problem.

International interest in the subject in fact dates back to 1934 when the League of Nations asked governments whether they kept statistics on road accidents and their causes and if so on what basis they did so. A Committee for the Unification of Statistics Relating to Road Traffic Accidents was established in 1935 and met in 1936 and 1937. It recommended compilation of statistics in a uniform manner and the adoption of the International List of Causes of Death for the purpose. After the war the United Nations Economic Commission for Europe through its Subcommittee on Road Transport revived interest in the subject by setting up a Working Party on the Prevention of Road Accidents. The Economic Commission for Asia and the Far East also set up a working party in 1950 to consider *inter alia* the problem of accident statistics. WHO's interest has been in accidental deaths of all kinds the most important of which include those due to motor vehicle accidents drowning poisoning and falls.

The International Statistical Classification of Diseases Injuries and Causes of Death gives a dual classification of accidents according to the external cause and according to the nature of the resulting injury. In the former classification which comprises 124 categories the main division lies between transport accidents and accidents from other causes. The WHO *Epidemiological and Vital*

Statistics Report has included statistics of both these kinds of injury^a for 18 countries throughout the world using figures based on the Intermediate List of the 1948 International Classification and adopting the classification by external cause only. These statistics cover deaths from all accidents and—published in separate tables—from transport accidents with their relationship numerically and proportionately to general mortality on deaths from accidents both generally and by categories according to sex and age as well as detailed data concerning for example deaths from the various kinds of accidental fall and from poisoning and infant mortality from certain accidental causes.

Accidents are the leading cause of death between the ages of 1 and 19^a in most of a group of selected countries throughout the world. In the Netherlands in 1954 they were responsible for 30.40% of all deaths. In childhood mortality from accidents is highest at the pre school age; it then falls for school children but increases again somewhat in adolescence. Since the beginning of the century it has decreased in Europe for the pre school group in spite of a growing traffic accident toll because deaths from drowning and burns and scalds have diminished. It has remained almost level for school age and adolescent groups where increasing deaths from traffic accidents have cancelled out the decrease in deaths from other accidental causes.

For countries outside Europe accidents also constitute an important problem. The highest accident rate of all for girls in the years 1951-53 was in Ceylon. The rate for both sexes was high in Australia Canada Ceylon and the United States. In Canada and the United States about a quarter of all deaths every year among pre school children and a third of those among elementary schoolchildren result from accidents of one kind or another. Accidents kill more than twice as many pre school children as do measles scarlet fever whooping cough diphtheria dysentery tuberculosis and polio.

Epidemiol. Infect. 1956, 9, 1. 1953, 6, 59.
See also: S. Albrecht, R. M. & G. B. B. (1946) *Brit. Med. J.* 1, 15, 123.

In the general section of the report which precedes the description of these methods the Committee reviews the various sources of radioactive contamination and discusses the basic principles that have to be taken into account in devising methods of evaluation of environmental contamination and internal contamination of the human body. Brief reference is made to precautions that should be taken to minimize the release of radioactive substances into the environment and to avoid unnecessary exposure of workers or members of the general public. Tables giving the maximum permissible concentrations of radionuclides in air and

water—based on the recommendations of the International Commission on Radiological Protection—are also included.

In order to obtain a reliable assessment of radioactive contamination it is essential that the samples used should be representative. Suitable sampling techniques for ensuring this are recommended by the Committee with separate consideration of each type of substrate likely to be examined. The report concludes with a discussion of the instrumentation required for carrying out radiochemical analysis, brief indications being given of the particular applications of the different types of equipment available.

Notes and News

Regional Committee for South East Asia

The twelfth session of the WHO Regional Committee for South East Asia was held in Kandy, Ceylon, from 3 to 9 September 1959. Representatives of 9 countries were present. The United Nations, FAO and UNICEF and a number of non-governmental organizations were also represented and the session was attended by Dr N. I. Craschchenkov, Assistant Director General of WHO. The following officers were elected: Dr W. A. Karunaratne (Ceylon), Chairman and Dr U. Mauné U. (Burma), Vice-Chairman.

Dr C. Mani, WHO Regional Director for South East Asia, presented his report for the period August 1958–July 1959, in which he stressed that, owing to the limited resources available in the Region for public health work, care must be taken to see that the best possible use was made of them. For example, the number of medical schools had been increased and the number of admissions to these schools doubled, but adequate teaching staff had not been provided; this was a false economy since the result might well be a vast number of inadequately trained doctors. Dr Mani went on to give other

examples of the uneconomical use of public health staff and funds in the Region. Doctors and nurses were spending part of their time and energy on work which could be done by clerks or even domestic workers. There were too many different courses for auxiliary medical personnel whose training should be streamlined. There was an unnecessary and uneconomical tendency to use the resources of maternity hospitals for perfectly normal deliveries and to give too little encouragement to domiciliary midwifery. Not enough attention was being paid to preventive medicine and health education by the staffs of the rural health centres. There was still a general lack of enthusiasm about improving sanitation. Costly medical equipment, especially X-ray units and other electro-magnetic apparatus, was frequently out of order for lack of proper maintenance, while very few of the health institutions possessing such equipment had properly trained technicians on their staffs. Dr Mani added that such instances of the uneconomical use of resources were not intended to disparage the heroic efforts being made by the countries of South East Asia to improve their peoples' health against tremendous odds; these efforts had resulted in some expansion of public health programmes despite the economic difficulties involved.

the countries of the Region were already committed to heavy expenditure on malaria eradication within their own borders and so could not give substantial financial help to the WHO fund. Nevertheless such small contributions as they could make would be a token of their support of the world wide effort for malaria eradication.

Three meetings were devoted to technical discussions on The role of immunization in communicable disease control. It was agreed that high priority should be given to the eradication of smallpox through mass vaccination campaigns organized on a nation wide basis. The administrative technical and budgetary aspects of smallpox eradication were discussed in detail.

A recommendation was made that as soon as the major problem of smallpox is brought under control mass immunization campaigns against whooping cough diphtheria tetanus typhoid fever and tuberculosis should be started. In the meantime immunization programmes against the latter diseases should wherever possible be carried out through the existing medical and public health services. A regular schedule for immunizations of children from birth to school leaving age was recommended.

In the general discussion of the various diseases considered stress was laid on the importance of collecting essential data on the extent and pattern of these diseases by the establishment of epidemiological units. Only thus can an immunization programme be planned and undertaken in an effective and economical manner. WHO is helping in the establishment of epidemiological units by providing consultants and granting fellowships.

The question of the date of the Committee's next session was left open pending a final decision on the date and place of the Fourteenth World Health Assembly. The Regional Director was therefore authorized to fix the date of the 1960 session in consultation with the Chairman of the Regional Committee notifying the Member States of the Region in due course.

Regional Committee for Europe

The WHO Regional Committee for Europe met for its ninth session in Bucharest, Romania, from 8 to 11 September 1959. It was attended by representatives of 28 Member States of the

Region and observers from a number of governmental and non governmental international organizations. Dr M. G. Candau, Director General of WHO, was present at the concluding meetings of the session.

The Committee elected the following officers: Professor V. Marinescu (Romania) Chairman; Dr J. F. Goossens (Belgium) and Dr A. Engel (Sweden) Vice Chairmen; Dr Georges Belios (Greece) Rapporteur.

In his report for the period July 1958 to June 1959 Dr P. J. J. van de Calseyde, WHO Regional Director for Europe, stated that the leading WHO activity in the Region was still the education and training of personnel through fellowships, training courses, seminars and the provision of visiting lecturers. Other traditional activities had been continued including the control of communicable diseases, notably tuberculosis and trachoma. Increased attention had been paid to rural health activities which were of fundamental importance since so large a proportion of the populations of the Region lived in rural areas (84% in Yugoslavia, 79% in Turkey, 77% in Morocco and Romania, 75% in Bulgaria, 69% in Poland and Portugal, 63% in Greece and Spain, etc.).

In the field of environmental sanitation attention continued to be concentrated on the related problems of water supply, waste disposal and water pollution. Air pollution was also becoming a serious problem as well as protection against ionizing radiation which had been the subject of special international training courses.

There had been a marked increase in malaria eradication activities and in WHO assistance to certain countries for this purpose. In most of the malarious areas of the Region the surveillance stage had been reached but a special effort was needed to achieve total eradication before further mosquito resistance to insecticides developed or interest waned.

Other activities which had received particular attention were mental health, maternal and child health and nursing. The aim of the nursing programme was to develop complete family services combining public health and home nursing, with increasing emphasis on health education, mental health and rehabilitation. Fellowships for studies in public health, nursing education and nursing administration had been granted to nurses from 6 countries in the Region.

During the period under review WHO had helped governments in the Region with about 130 field projects employing some 240 field workers. These projects were concerned mainly with the control of communicable diseases, the promotion of rural health services and the training of many categories of health workers. Every country in the Region now had a malaria eradication programme.

Referring to the tuberculosis research project in Madras for the comparison of home and hospital treatment Dr Mani said: "We can now hope that the vast majority of cases can be adequately treated at home. This would bring tuberculosis control for the first time well within the resources of countries in South East Asia and of economically under developed countries elsewhere. WHO assistance to yaws, leprosy and trachoma control programmes had continued and a renewed effort had been made to stimulate preparations for a smallpox eradication programme."

Strong WHO and UNICEF support had been given to the development of rural health centres in India and Afghanistan and a small rural health programme had been started in Indonesia. Increasing attention was being paid to sanitation programmes and a WHO consultant team was to advise the State Government of West Bengal on water supply and sewerage schemes for the city of Calcutta. Child health services and the teaching of paediatrics had made notable progress in India, where a little over a year ago there were only 2 full time professors of paediatrics. Today there are 6 professors and 4 associate professors of paediatrics in India.

Progress had also been made in the strengthening of national health services and of health education services. As regards medical education 12 internationally recruited professors had been teaching in various medical faculties in the Region. The WHO assisted School of Radiography in Ceylon is now to be used for training X ray technicians from all parts of the Region. During the year 131 WHO fellowships were awarded to public health staff in the Region.

In the discussion on the Regional Director's report there was general agreement that the economic situation in the countries of the Region, especially the severe shortage of foreign exchange, was seriously hampering the development of

health services. The suggestions contained in the report for making the best use of available resources were endorsed. The development of units for epidemiological investigation in every health department, the revision of present systems of health records in the Region and measures to prevent accidents in the home were advocated.

The proposed programme and budget for 1961 provided for expenditures of \$1 381 000 from the regular WHO budget and of \$1 340 000 from United Nations Technical Assistance funds, \$1 068 000 from the Malaria Eradication Special Account and \$4 886 000 from other extra budgetary funds. The programme and estimates were endorsed by the Committee.

On the subject of the proposed International Health and Medical Research Year which is to be reconsidered at the Thirteenth World Health Assembly, the Committee doubted that the health administrations of the South East Asia Region would have the necessary resources in the near future to participate effectively. It considered that the expenditure that would be involved on the part both of national administrations and of WHO might more profitably be made on WHO's field activities and that the proposed undertaking should not be sponsored by the Organization for the time being.

Satisfaction was expressed at the fact that following resolutions of the Eleventh World Health Assembly and the eleventh session of the Regional Committee, every country in the Region had taken active measures to plan comprehensive vaccination campaigns wherever smallpox was a major public health problem or to intensify existing vaccination or revaccination services in those countries where smallpox had in the past been under control. Urgent action for the eradication of the disease from the Region was advocated.

The Committee considered the question of the new Regional Office building and expressed the hope that this building would be completed in time for the Fourteenth World Health Assembly which was expected to be held in New Delhi early in 1961.

There was a discussion on the Malaria Eradication Special Account to which three countries in the Region had contributed. Delegates from two other countries announced that their governments had agreed to contribute. It was recognized that

special importance in the prevention of mental ill health. The participants supported the view that early treatment can be regarded as the beginning of prevention and that the extension of mental health practice will be possible only if mental health is given priority in public health programmes.

The Committee confirmed its decision to hold its tenth session in Copenhagen and its eleventh session in Luxembourg.

Regional Committee for the Eastern Mediterranean

Both Sub-Committee A and Sub-Committee B of the ninth session of the WHO Regional Committee for the Eastern Mediterranean met in September this year.

Sub-Committee A with 13 Member States represented met at the Eastern Mediterranean Regional Office Alexandria United Arab Republic from 14 to 19 September. Dr M. O. Shoib (United Arab Republic) was elected Chairman of this Sub-Committee. Brigadier M. Sharif (Pakistan) and Dr Hassan Nassif (Saudi Arabia) were Vice Chairmen.

Sub-Committee B with representatives from 4 Member States met from 28 to 30 September at WHO Headquarters Geneva. Professor M. Etemadian (Iran) was elected Chairman. Medecin Colonel P. Faure (France) who was elected Vice Chairman was also designated by both Sub-Committees to co-ordinate and harmonize their decisions. The resolutions adopted by the two Sub-Committees were in the majority of cases identical.

In the discussions on the annual report of Dr A. H. Taba WHO Regional Director for the Eastern Mediterranean which covered the period July 1958-June 1959 the consensus was that the programme was developing along satisfactory lines. Particular appreciation was expressed of the increasing emphasis on education and training, the control and eradication of communicable diseases, the improvement of environmental sanitation and the promotion of maternal and child health in all its aspects. The extension of inter-country and inter-regional undertakings was also approved. A continuing evaluation of health activities as an integral part of national health

programmes was urged, as well as co-ordination and co-operation at the regional level in all health matters.

Research particularly on bilharziasis and malaria and on the health aspects of radiation was considered essential and it was thought that an investigation of the use of local medicinal herbs also might be of value.

The development of vital and health statistics was considered essential to progress in all fields of health and the value of long term national health programmes was generally endorsed.

In the discussions on technical matters the need for countries to undertake programmes for malaria eradication with added vigour was stressed. Nine countries of the Region had already made initial contributions to the Malaria Eradication Special Account and further contributions were urged. The problem of malaria vectors in wells used for drinking water was raised and it was recommended that a pilot study should be undertaken to find the most suitable method of dealing with it. The Regional Director was requested to consider the establishment of inter-country field malaria eradication evaluation teams. Stress was laid on the need for appropriate legislative measures which would endow the administrative machinery of national malaria eradication services with all necessary authority and responsibility for the effective direction of malaria eradication campaigns.

With regard to smallpox it was considered that mass vaccination campaigns should be centrally administered and co-ordinated and dried smallpox vaccine used. Research to devise a cheaper vaccine was recommended.

Governments of neighbouring countries were recommended to conclude agreements for simultaneous vaccination programmes in boundary zones in order to create immune barriers and prevent the importation of smallpox, as well as to establish efficient quarantine control services.

Nutrition was recognized as a major problem in the Region particularly in view of the increasing population. Not only the medical but also the agricultural and economic aspects of this problem were important. The need for health education in this field particularly where habits and traditions prevented populations from using readily available and abundant foods was emphasized and nutrition training programmes

The increased proportion of aged persons in most European populations presents many problems to the public health authorities. During the year under review, an advisory group met to study this problem and to discuss the planning and organization of medical care for the aged.

In addition to these traditional programmes certain newer activities had been encouraged including investigations into cardiovascular disease and cancer control and epidemiological research into other chronic and degenerative diseases. For these studies to be wholly successful statistical and epidemiological activities would have to be further developed.

Concluding his report Dr van de Calseycyde welcomed the increasing co-operation of certain Member States which had recently resumed active participation in the Organization's work including Czechoslovakia, Romania and the USSR. All were participating in the fellowships programme and other inter-country activities.

The budget proposed for the 1961 programme provided for the use of some \$1 485 000 from the regular WHO budget, \$300 000 from United Nations Technical Assistance funds and \$1 470 000 in anticipated contributions from UNICEF for joint programmes. These estimates were endorsed by the Committee with certain minor adjustments.

In the discussions on the 1961 programme the importance of hospital administration was mentioned and the wish was expressed that a course on this subject be organized in the Russian language. New activities which had not yet found a place in the regional programme were advocated including work on epidemic hepatitis and rheumatic diseases. The Regional Director was also asked to pay increased attention to the international co-ordination of research.

The rehabilitation of physically and mentally handicapped persons—who account in Europe for at least 10% of the population of working age—was mentioned as a problem of great urgency. The Regional Director was asked to provide specialized training in rehabilitation and to study means of integrating rehabilitation services within the general system of medical care.

The Committee noted the endorsement by the Twelfth World Health Assembly of a world wide programme for safe and adequate water supplies. In view of the relatively high standard of

domestic water supplies in most European communities it was hoped that the countries of the Region would play a leading part in furthering the programme by providing experts and training facilities in this field. Waste disposal and water pollution, which are growing problems in Europe, were cited as needing parallel consideration.

On the subject of atomic energy the Committee noted with regret that health administrations were often not consulted or kept informed when atomic installations were planned and that there was unnecessary exposure to radiation as a result of the indiscriminate use of X-rays as well as radioisotopes. It was considered that WHO could perform a useful service by facilitating the exchange of information on standards of radiation protection and on principles for modern legislation in this field. Research and further training courses on radiation and its dangers were also advocated.

A plan was adopted for the total eradication of malaria from the Region by 1962 at the latest.

The Committee expressed interest in the holding of a well-planned International Health and Medical Research Year with clearly defined aims and objectives though some representatives doubted the usefulness of such an enterprise.

Technical discussions were held on the place of mental health in a public health programme. In the course of these discussions the following recommendations were made: out-patient and domiciliary mental health services should be considerably extended; district dispensaries directed by psychiatrists should be established; psychiatric departments should form an integral part of all general hospitals; adequate training in psychiatry and psychology should be provided for all medical practitioners; medical students, nurses and other professional health workers should be given priority in the care of sub-normal and physically handicapped children; to the mental health problems of women in pregnancy and childbirth; and to those of young couples on the threshold of marriage and parenthood. Special attention should also be paid to the mental health problems of the aged; a careful study of housing conditions should be made to ensure the provision of adequate space, well-balanced lighting and privacy; the general improvement of social conditions and the provision of adequate material security should be considered as of

WHO policy of strengthening public health administrations had been maintained. Emphasis had continued to be placed on the training of all categories of health personnel, the control of communicable diseases and the development of special services such as maternal and child health nursing, and environmental sanitation.

After almost seven years of research and study WHO and the Government of the Philippines were working on a plan to integrate bilharziasis control into the national health programme of that country. Yaws projects were progressing towards complete control of the disease as improved rural health teams extended their activities to areas formerly deprived of medical care.

Member States had shown increasing interest in the possibility of the hygienic treatment of refuse and night soil for the production of fertilizers. Full scale composting plants were being installed in countries where WHO had assisted pilot composting projects.

There was growing interest in vital and health statistics and a number of governments had indicated willingness to participate in a regional seminar on the subject in 1960. The hospital records project in Singapore was developing into a medical statistics project aimed at improving vital and health statistics throughout Singapore. A project to reorganize and strengthen health statistical services in Viet Nam was expected to start early in 1960.

Five WHO assisted health projects had been successfully completed and the international staff had been withdrawn. Yaws control in Laos, nursing education in Japan and the Federation of Malaya, midwifery training in the Philippines and the exchange programme between the London School of Hygiene and Tropical Medicine and the University of Malaya.

Despite these encouraging developments there were still a number of problems confronting public health authorities in the Region. Dr Fang cited in particular the shortages of personnel and funds which often resulted in ineffective administration. In some countries the shortage of personnel was serious enough to threaten the success of such vast undertakings as malaria eradication. The long term financing of national health projects was another major problem, and Dr Fang called the attention of govern-

ments to the danger of too much reliance on foreign aid as this may lead to the development of programmes which the countries can hardly hope to continue.

The Committee endorsed the programme and budget estimates for the Region for 1961. These provided for expenditures of \$1 585 000 from the regular WHO budget, \$640 000 from the Malaria Eradication Special Account, \$697 000 from United Nations Technical Assistance funds and anticipated extra budgetary funds to the amount of \$559 000.

The Committee noted with concern that *Anopheles murphyi* flavescens, the chief malaria vector in the Philippines had become resistant to dieldrin with the result that transmission of malaria was recurring in several areas where complete interruption had earlier been achieved. It also noted that there had been a disappointing response to the appeal for contributions to the Malaria Eradication Special Account. Governments were urged to ensure that personnel, money and material would be available for malaria eradication and that the progress of their eradication campaigns would be rigorously assessed so that speedy action might be taken to counteract any unexpected difficulty. The Regional Director was asked to keep governments informed of any further cases of resistance arising in the Region and to circulate at the earliest possible moment information on the results of trials of medicated salt as a malaria suppressant.

On the subject of environmental sanitation, the Committee recommended that the health authorities of Member States prepare a long term programme for the development of community water supplies. This programme should include small water supply projects for rural areas.

In view of the divergent opinions expressed at the session concerning the proposed International Health and Medical Research Year the Committee decided to transmit the minutes of its discussion on this subject to the Director General.

The Committee noted that smallpox eradication campaigns had not yet been started in all the countries of the Region where endemic foci existed. It stressed the urgency of achieving world-wide eradication and recommended that

were advocated. A survey of diets was recommended so that the extent of the problem might be assessed.

The resolution of the Twelfth World Health Assembly on community water supplies was noted with satisfaction and countries of the Region were urged to contribute to the special account established by WHO in this connexion. The need in most parts of the Region for adequate and safe water supplies was overwhelming although in two countries a high percentage of the inhabitants were reportedly supplied with pure piped water. The question of waste water disposal was also considered to need special attention. It was recommended that all countries of the Region make a special effort to develop rational water supply programmes with due attention to the administrative, legal, economic, fiscal and technical problems involved.

The education of health personnel at all levels and particularly nurses in the public health aspects of radiation was considered of paramount importance. The training of specialists in the protection of the public against the harmful effects of ionizing radiation was also urged as well as research on the somatic and genetic changes due to radiation. It was recommended that Member States take measures to ensure the safe disposal of radioactive wastes and to provide for the inspection of all institutes and establishments in which ionizing radiation was utilized.

The question of khat was also discussed. It was considered that legislation against the use of this stimulant should perhaps not be enforced until its addiction-forming qualities were proved and the social, medical, legal and economic implications explored.

The question of the proposed International Health and Medical Research Year was discussed and it was the general feeling that it should be deferred for the present.

The proposed programme and budget for the Eastern Mediterranean Region for 1961 was endorsed. The estimates provided for the use of \$1 800 000 from the regular budget of WHO, some \$900 000 from United Nations Technical Assistance funds and approximately \$1 000 000 from the Malaria Eradication Special Account. The increasing expenditure on fellowships, university programmes and mental health activities was noted with satisfaction.

Sub Committee A held technical discussions on ancylostomiasis which is one of the most important parasitic diseases in the Region. A survey of the basic factors involved in the epidemiology of the disease, the improvement of sanitation in the affected areas and the development of safe remedies for mass treatment were recommended. It was suggested that measures to combat this problem should be included in national schemes for economic development.

The technical discussions at the meeting of Sub Committee B were on the subject of poliomyelitis. It was noted that serological surveys had confirmed the endemicity of poliomyelitis in the Eastern Mediterranean Region and that the disease had some times reached epidemic proportions in certain countries of the Region during the past ten years. Member States were urged to make poliomyelitis vaccination compulsory by law and to promote a system of reporting the disease in order to facilitate the accumulation of accurate statistical data.

Both Sub-Committees next year will hold technical discussions on the subject of tuberculosis control with particular reference to domiciliary treatment. Sub Committee A will meet in Tunis, the meeting place of Sub Committee B has not yet been decided.

Regional Committee for the Western Pacific

The WHO Regional Committee for the Western Pacific held its tenth session in Taipei, China (Taiwan) from 16 to 22 September 1959. The session was attended by representatives of 9 countries in the Region and of 5 other countries responsible for territories in the Region. Representatives of the United Nations, UNICEF, the Technical Assistance Board and a number of non-governmental organizations were also present. The Committee elected the following officers: Dr C. K. Chang (China) Chairman, Dr E. Valencia (Philippines) Vice Chairman, Dr L. J. Clapham (United Kingdom) and Dr Le Cuu Truong (Viet Nam) Rapporteurs.

In his annual report covering regional activities from July 1958 to June 1959, Dr I. C. Fang, WHO Regional Director for the Western Pacific, said that during the year under review the general

continue as before to carry out field work including prevalence surveys of tuberculosis and programmes of treatment with the new anti tuberculosis drugs. Studies will continue on the applicability of simple economical methods for the diagnosis and treatment of tuberculosis patients without hospitalization wherever possible.

The Tuberculosis Research Office was originally established to analyse the data assembled during the BCG vaccination programme launched by the Danish Red Cross in 1947. This programme was subsequently extended with the help of the Norwegian Relief for Europe the

Swedish Red Cross and UNICEF and became the International Tuberculosis Campaign (ITC). The ITC assisted vaccination programmes in 23 countries before officially turning over its activities to WHO and UNICEF in 1951. The work has been continued ever since by these two agencies since the launching of the original programme 245 million children and young adults have been tested for tuberculosis and 9 million vaccinated in 47 countries. This vast enterprise has been supported since 1949 by the work of the Tuberculosis Research Office in research training and statistics.

People and Places

Water supply for Calcutta

In India the area of endemic cholera falls mainly within the State of West Bengal with its centre in Greater Calcutta. The disease is endemic throughout the year with peak periods from March to June. From time to time it assumes epidemic form, as in 1958 when there was an outbreak resulting in almost 5000 cases in Calcutta City alone. Unsatisfactory water supplies and lack of sewage disposal facilities are the principal reasons for this situation.

The difficulty of supplying safe water and providing drainage in this area can be gauged from the fact that Calcutta has over the years become a vast industrial centre sprawling along the river Hooghly for about forty miles with a depth of three to five miles on either side of the river. There are over thirty municipalities or local bodies in the area including the Corporation of Calcutta which are independent of one another and have developed their own water supply and sanitary arrangements. Piped water supplies are limited mainly to Calcutta City and to Howrah. Elsewhere the water is generally obtained from tube wells of various sizes and similar wells recently had to be sunk in Calcutta City itself to increase the water supply.

In Calcutta City the regular water system supplies both filtered water and crude water from the river. The latter is not of course

intended for human consumption but, since the filtered water is supplied intermittently people in many places use the crude water for household purposes and thus endanger their health.

At the request of the Government of India WHO has sent a team of consultants to examine the water supply situation in Calcutta and to recommend measures for its improvement. The team will have to seek solutions not only to the formidable engineering problems involved in finding, developing and treating an adequate and dependable source of fresh water but also to the very great political and financial problems inherent in establishing a metropolitan board or organization.

The WHO team consists of four leading experts in the fields of water supply engineering, public administration, and epidemiology. The Chairman is Dr A. Wolman, Professor Emeritus of Sanitary Engineering at Johns Hopkins University, Baltimore, Md., who has wide experience in planning for the development and utilization of water resources in different parts of the world. Among the governments to which he has acted as consultant are those of Brazil, Ceylon, Chile and Israel.

The other engineer on the team is Mr H. F. Cronin who has been Chief Engineer of the London Metropolitan Water Board for the past twenty years and thus has special knowledge of the problems of hydraulic engineering in a large

the health administrations of the countries where the disease was still present should initiate eradication programmes as soon as possible using a stable potent vaccine

The technical discussions were on the subject of Tuberculosis control. The importance of health education and BCG vaccination in the prevention of tuberculosis was stressed. It was agreed that in BCG programmes a wet vaccine should be used where practicable although in areas difficult of access freeze dried vaccine would have to be used. While it was the opinion of the participants that chronic cases of infectious tuberculosis should ideally be segregated it was recognized that this step was not always possible and that continued domiciliary treatment with antituberculosis drugs was the best alternative.

It was agreed that prevalence surveys were desirable since mortality rates were no longer adequate to assess the tuberculosis problem in a community and morbidity figures based on notifications were often inaccurate. The data acquired in prevalence surveys should enable efforts to be concentrated on those areas where prevalence was highest for cases found during surveys domiciliary treatment should be started through existing health agencies. The importance of using standard survey methods that would permit international comparability of the findings was stressed. It was the general opinion that the new methods of tuberculosis control had made control programmes practicable in areas where they would previously have been too costly for implementation. The subject of the technical discussions at the Committee's 1960 session will be The organization and administration of rural health services.

The Regional Committee for the Western Pacific will hold its eleventh session in Manila Philippines in 1960.

Director General's term of office extended

Dr M G Candau Director General of WHO has accepted the offer of the Twelfth World Health Assembly to extend his term of office for a further three years. Dr Candau was appointed Director General of the Organization in 1953 and his present contract was due to

expire on 21 July 1960. At the Twelfth World Health Assembly last May a resolution was passed expressing deep appreciation of his competent and devoted leadership and offering to renew his contract until July 1963 to assure further successful development of the Organization.

Venereal infectious and treponematoses

Since the WHO Expert Committee on Venereal Infections and Treponematoses met in London in 1952¹ there have been a number of developments in this field. New technical knowledge has offered further possibilities for the control of venereal infections and eradication of the endemic treponematoses particularly yaws. On the other hand penicillin is becoming less effective against gonorrhoea owing to the growing resistance of the gonococcus to this antibiotic while penicillin reactions appear to be on the increase. Moreover although syphilis a few years ago declined in many parts of the world to 90-95% of its immediate post war level there has recently been an upward trend in the incidence of the disease in some countries.

A WHO Expert Committee on Venereal Infections and Treponematoses met in Geneva from 21 to 26 September 1959 to discuss these and related problems including the development of international research in this field and the treatment of seafarers for venereal infections under the Brussels Agreement.

An account of the Committee's work will be published in the Chronicle when its report appears.

Transfer of Tuberculosis Research Office

The Tuberculosis Research Office of WHO has been transferred from Copenhagen where it was established in 1949 to WHO Headquarters in Geneva. This has been done in order to centralize the Organization's tuberculosis programme. Part of the staff of the Research Office will

continue as before to carry out field work including pre-alence surveys of tuberculosis and programmes of treatment with the new anti-tuberculosis drugs. Studies will continue on the applicability of simple economical methods for the diagnosis and treatment of tuberculosis patients without hospitalization wherever possible.

The Tuberculosis Research Office was originally established to analyse the data assembled during the BCG vaccination programme launched by the Danish Red Cross in 1947. This programme was subsequently extended with the help of the Norwegian Relief for Europe, the

Swedish Red Cross and UNICEF and became the International Tuberculosis Campaign (ITC). The ITC assisted vaccination programmes in 23 countries before officially turning over its activities to WHO and UNICEF in 1951. The work has been continued ever since by these two agencies since the launching of the original programme 245 million children and young adults have been tested for tuberculosis and 9.2 million vaccinated in 47 countries. This vast enterprise has been supported since 1949 by the work of the Tuberculosis Research Office in research training and statistics.

People and Places

If the supply for Calcutta

In India the area of endemic cholera falls mainly within the State of West Bengal with its centre in Greater Calcutta. The disease is endemic throughout the year with peak periods from March to June. From time to time it assumes epidemic form, as in 1958 when there was an outbreak resulting in almost 5000 cases in Calcutta City alone. Unsatisfactory water supplies and lack of sewage disposal facilities are the principal reasons for this situation.

The difficulty of supplying safe water and providing drainage in this area can be gauged from the fact that Calcutta has over the years become a vast industrial centre sprawling along the river Hooghly for about forty miles with a depth of three to five miles on either side of the river. There are over thirty municipalities or local bodies in the area including the Corporation of Calcutta which are independent of one another and have developed their own water supply and sanitary arrangements. Piped water supplies are limited mainly to Calcutta City and to Howrah. Elsewhere the water is generally obtained from tube wells of various sizes and similar wells recently had to be sunk in Calcutta City itself to increase the water supply.

In Calcutta City the regular water system supplies both filtered water and crude water from the river. The latter is not, of course

intended for human consumption but, since the filtered water is supplied intermittently people in many places use the crude water for household purposes and thus endanger their health.

At the request of the Government of India WHO has sent a team of consultants to examine the water supply situation in Calcutta and to recommend measures for its improvement. The team will have to seek solutions not only to the formidable engineering problems involved in finding developing and treating an adequate and dependable source of fresh water but also to the very great political and financial problems inherent in establishing a metropolitan board or organization.

The WHO team consists of four leading experts in the fields of water-supply engineering, public administration, and epidemiology. The Chairman is Dr A. Wolman, Professor Emeritus of Sanitary Engineering at Johns Hopkins University, Baltimore, Md., who has wide experience in planning for the development and utilization of water resources in different parts of the world. Among the governments to which he has acted as consultant are those of Brazil, Ceylon, Chile and Israel.

The other engineer on the team is Mr H. F. Cronin who has been Chief Engineer of the London Metropolitan Water Board for the past twenty years and thus has special knowledge of the problems of hydraulic engineering in a large

urban area. He has been President of the Institution of Civil Engineers and of the Institution of Water Engineers in London.

Public administration is represented by Dr L. Gulick, President of the Institute of Public Administration and Director of the Bureau of Municipal Research, New York, and former Eaton Professor of Municipal Science and Administration at Columbia University. He has been employed as public administration consultant by the United States and other governments.

The epidemiologist on the team is Dr R. Pollitzer of the George Williams Hooper Foundation, University of California Medical Center, San Francisco. Dr Pollitzer has long been associated with international health work and for several years was a staff member of WHO. He is the author of the WHO monographs *Plague* and *Cholera*.

Live poliovirus vaccines

By far the most extensive trials of live poliovirus vaccines are those in progress in the USSR where the number of children vaccinated with the strains developed by Dr Albert Sabin now exceeds 6 million. Favourable reports of the trials were presented at the Conference on Live Poliovirus Vaccines held in Washington, D.C. in June 1959.¹ If these trials meet the criteria formulated by the WHO Expert Committee on Poliomyelitis,² it seems that the public health application of the vaccines may be feasible.

Dr Dorothy L. Horstmann therefore recently went to the USSR, Czechoslovakia and Poland as an impartial observer to study the large scale field trials carried out with the live vaccines in all three countries. Dr Horstmann holds senior appointments at Yale University in the Communicable Disease Service of the Paediatric Department and in the Section of Epidemiology and Preventive Medicine. She has been engaged for many years in epidemiological and virological studies on poliomyelitis and has recently undertaken both field and laboratory studies on live poliovirus vaccines.

Malariaologist for Turkey

Dr Carlos Balestrini of Venezuela will serve as malariaologist on a WHO malaria eradication team in Turkey. The team will also include an entomologist, a sanitary engineer, a sanitarian and a laboratory technician. Malaria control operations in Turkey started in 1952 and the internationally assisted eradication campaign began in 1956 under an agreement between the Turkish Government, UNICEF and WHO. New legislation has been prepared by the Government to facilitate the campaign and two short term consultants were supplied by WHO to help train Turkish doctors in eradication techniques.

Dr Balestrini received his basic medical training in Rome and Palermo, Italy, and later obtained a diploma in tropical medicine at Maracay, Venezuela. He has served for five years as Chief Physician of the Malaria Eradication Service for the Venezuelan states of Trujillo and Merida. He has also been in charge of malaria eradication courses at Maracay and in Mexico.

¹ S. WHO Ch. 11, 1959, 13, 40.
² WHO Hk. O. g. t. h. R. p. S. 1958, 145.

CORRIGENDUM

Vol. 13, No. 11

PEOPLE AND PLACES

p. 430, right hand column, item headed *Urbanisation survey*, lines 2-4
delete Office of the High Commissioner for Hygiene and Public Health
insert Ministry of Health

International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 7 of the Procedure for the Selection of Recommended International Non-Proprietary Names for Pharmaceutical Preparations¹ notice is hereby given that the following are selected as recommended international non-proprietary names

The inclusion of a name in the lists of recommended international non-proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

RECOMMENDED INTERNATIONAL NON-PROPRIETARY NAMES (*Rec. I.N.N.*) LIST 3²

<i>Recomm. ded. I. n. n. on I. Ann. P. prior (La. n., Eng. sh.)</i>	<i>Chem. name Description</i>
acenocoumarolum acenocoumarol	3 [-(4-nitrophenyl)- β -cetyloethyl]-4-hydroxycoumarin
acepromazum acepromazine	2 acetyl 10 (3-dimethylamino propyl)phenothiazine
acetarsol m acetarsol	3 cetamido-4-hydroxyphenylarsinic acid
acetazolam d m acetazolamide	2 acetamido-1,3,4-thiadiazole 5-sulfonamide
acetylcholin chloridum acetylcholine chloride	2 acetoethylmethylammonium chloride
acidum ascorbicum ascorbic acid	3-o- α -L-gulofuranolactone (cyclic form)
acidum edeticum edetate acid	thylated mono-N,N,N,N-tetraacetic acid
acidum folicum folic acid	N-[4-{[2-mono-4-hydroxy-6-pyridyl(methyl)amino]benzoyl}L-(+)-glutamic acid
acidum iophenicum iophenic acid	-3-hydroxy-2,4,6-triodobenzyl-butylamide
acidum nicotinicum nicotinic acid	pyridine-3-carboxylic acid
didipodinum didipodone	diethyl 2-(2,4,6-triodo-3-carboxyanilide)
ethisteronum ethisterone	17-ethynyl-17 β -hydroxy-3-o-diol-4-ene
aethylbiscoumarinum ethylbiscoumarinate	3,3'-carboxymethylenebis(4-hydroxycoumarin)thylester

¹Off. Rec. Wld. Hlth. Org. 1955 40:3 (Resol. on EB19 RT)
²Previous list of recommended international non-proprietary names can be found in *Ch. on Wld. Hlth. Org.* 1955 9:185 W.H.O. Chronicle 1949 13:106

urban area. He has been President of the Institution of Civil Engineers and of the Institution of Water Engineers in London.

Public administration is represented by Dr L. Gulick, President of the Institute of Public Administration and Director of the Bureau of Municipal Research, New York, and former Eaton Professor of Municipal Science and Administration at Columbia University. He has been employed as public administration consultant by the United States and other governments.

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See WHO Ch. 11, 1959, 13, 40.
Wild. Hlth. Org. i. ch. R. p. 5, 1958, 145.

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CORRIGENDUM

Vol. 13, No. 11

PEOPLE AND PLACES

p. 430, right-hand column, item headed *Urban alien survey*, lines 2-4
delete: Office of the High Commissioner for Hygiene and Public Health
insert: Ministry of Health

carbazochromi salicylas
carbazochrome salicylate

adrenochrome monosaccharazone sodium salicylate complex

carbamazolum
carbamazole

1-ethoxycarbonyl-3-methyl-2-thiomidazole

carbinotaminum
carbinotamine

2-dimethylaminoethoxy pyridyl-4-chlorophenylmethane

carzenidium
carzenide

4-carboxybenzenesulfonamide

cetomacrogolum 1000
cetomacrogol 1000

polyethylene glycol 1000 monocetyl ether

chuniofonum
chuniofon

mixture of four parts by weight of 7-oxo-8-hydroxyquinoline-5-sulfonic acid and one part by weight of sodium bicarbonate

chlorambucium
chlambucil

p-ch-(2-chloroethyl)amino phenylbutyric acid

chlorbetamidum
chlorbetamide

N-(2,4-dichlorobenzyl)-N-(dichloroacetyl)ethanolamine

chlrdumorum
chlrdmorine

4-[3-(3-chlorophenyl)-4-oxopropyl]morpholine

chlrohevidum
chlroheidine

1,6-bis-(p-chlorophenyl)guanidobenzene

chlronsondaminum
chlronsondamin chloride

4,5,6,7-tetrachloro-2-(trimethylammoniummethyl)-N-methylsindole-3-dichloride

chlromerodinum
chlromerodrine

(3-chloromercurimethoxypropyl)urea

chlrobutanolium
chlrobutanol

1,1,1-trichloro-2-methylpropan-2-ol

chlroceresolum
chlroceresol

6-chloro-3-hydroxytoluene

chlroprocainum
chlroprocaine

β -diethylaminoethyl 2-chloro-4-aminobenzoate

chlroquinum
chlroquina

7-chloro-2-(4-diethylamino-1-methylbutylamino)quinoline

chlrotranisenum
chlrotranisen

tri-(p-methoxyphenyl)chloroethyl ether

chlrophenaminum
chlrophenamin

3-(p-chlorophenyl)-3-(2-pyridyl)-propyldimethylamine

chlortetracyclinum
chlortetracycline

7-chloro-4-dimethylamino-1,4,4a,5,5a,6,11,12-octahydro-3,6,10,12-tetrapentahydro-6-methyl-11-dioxonaphthalene-2-carboxamide

chlonechloridum
chlonechloride

2-hydroxyethyltrimethylammonium chloride

cinnofuradolum
cinnofuradone

1,2-dihydro-1-(1-trihydrofurfuryl)-3-dioxopropylbenzo(cinnoline)

conessinum
conessine

an alkaloid obtained from the seeds of *H. larrha* (L.) *ter* L.

crotamitonum
crotamiton

N-ethyl-N-o-tolylcrotonamide

aldosteronum	18-oxocorticosterone
aldosterone	
ambenoni chloridum	<i>N N</i> bis (2-diethylaminoethyl)oxamide
ambenonium chloride	bis 2 chlorobenzyl chloride
ambucainum	β diethylaminoethyl 4 amino-2 butoxybenzoate
ambucaine	
ambucetamidum	2 (di <i>n</i> butylamino) 2-(<i>p</i> methoxyphenyl)acetamide
ambucetamide	
aminotrozolum	2 acetamido-5 nitrothiazole
aminotrozoic	
aminometradinum	1 allyl 3-ethyl 6-amino 2,4-dioxo-1,2,3,4 tetrahydropyrimidine
aminometradine	
aminopterinum natrium	sodium 4 aminofolate
aminopterin sodium	
amiphenazolum	2,4-diamino-5 phenylthiazole
amiphenazole	
amisometradinum	6-amino-1,2,3,4-tetrahydro 3 methyl 1 methylallylpyrimidine
amisometradine	2,4 dione
amphetaminum	(\pm) 2 amino 1 phenylpropane
amphetamine	
atropini methonitras	methonitrate of (\pm) tropanyl 2 hydroxy 1 phenylpropionate
atropine methonitrate	
azacyclonolum	α α -diphenyl piperid-4-yl methanol
azacyclonol	
barbitalum	5,5-diethylbarbituric acid
barbital	
barbitalum natrium	sodium derivative of 5,5-diethylbarbituric acid
barbital sodium	
bemegridum	4-ethyl-4 methyl 2,6-dioxopiperidine
bemegride	
benactyzinum	2 diethylaminoethyl benzilate
benactyzine	
benzatropini methanesulfonas	tropine benzhydryl ether methanesulfonate
benzatropine methanesulfonate	
benzonatatum	2 (ω methoxyoctaethylneoxy)ethyl <i>p</i> butylaminobenzoate
benzonatate	
bietamverinum	2 diethylaminoethyl α phenyl piperidinoacetate
bietamverine	
bromazinum	{2-(<i>p</i> -bromodiphenylmethoxy)ethyl}dimethylamine
bromazine	
bucizinum	1 (4-chlorobenzhydryl)-4-(4 <i>tert</i> butylbenzyl)piperazine
bucizine	
busulfanum	1,4-dimethanesulfonoxybutane
busulfan	
calciferolum	9,10-secoergosta 5,7,10(19),22 tetraene 3-ol (vitaminD ₂)
calciferol	
calci saccharas	calcium D-glucarate
calcium saccharate	

edrophon floridum
edrophonium chloride
ergometrinum
ergometrin
ergotaminum
ergotamine
erythronium
erythronycin
etamphyl
etamphyl
ethersum
ethersine
ethnamatum
ethanate
ethotum
ethoin
ethipiconum
ethipone
etendinum
etendin
floratyrum
florantyrone
flidoxriso cet
flidoxrisone acetate
flomestonum
flomesterone
formitallin
formitazole
glucuroctom
glucuroctone
glutethimide
glutethimide
glycerol
glycerol
hactendinum
hactendine
hexocyclomethylulfas
hexocyclomethylulfate
hexyleum
hexyleamine
haptopyrrolidin
haptopyrrolidine
homarylinum
homarylin
hydrocortamat
hydrocortamat
hydrocortamat
hydrocortamat

ethylmethyl 3-hydroxyphenylammonium chloride
an alkaloid obtained from ergot
an alkaloid obtained from ergot
an antibiotic substance obtained from cultures of *Streptomyces* or the same substance produced by any other means
7-(2-ethylmethyl)theophylline
6-ethyl 1-(3,4-dimethoxybenzyl)quinoline
1-ethylcyclohexylcarbamate
3-ethyl 5-phenylhydantoin
4,6-dioxo-3-methyl-5,5-dimethyl-4,5,6-trihydropyridine
1-(2-hydroxyethyl)-4-phenylpiperidine-4-carboxylic acid ethyl ester
7-fluoranthracene-8-yl- γ -obutyrate
21-ceto-9-fluoro-11 β ,17-dihydroypregn-4-ene-3,20-dione
9-fluoro-11 β ,17-dihydro-17-methylandroster-4-ene-3-one
2-formamido-5-nitrothiazole
1- γ -ketone of D-glucose
3-ethyl 3-phenyl-2,6-dioxepine
propyl-3-ol
b-1,3-(β -ethylthio) 5-methyl 5-methylhexahydro-3,4-dione
A-(β -cyclohexyl β -hydroxy β -phenylethyl)-N-methylpiperazine-1-methylsulfate
1-cyclohexylamino-2-propylbenzoate
A-pyrrolidylethyl- β -phenylethylamine
A-methyl 5-methyl 1,2-methylene-diphenyl
1-dimethylaminoacetate 11-17-dihydroypregn-4-ene-3,20-dionehydrochloride

cryofluorane	1,2-dichloro-1,1,2,2-tetrafluoroethane
cryofluorane	
cyclomethycainum	3-(2-methylpiperidino)propyl <i>p</i> -cyclohexyloxybenzoate
cyclomethycaine	
cycloserinum	4-aminosoxazolidin-3-one
cycloserine	
cycriminum	1-phenyl-1-cyclopentyl-3-piperidinopropan-1-ol
cycrimine	
demecolcinum	deacetyl-methylcolchicine
demecolcine	
deserpidinum	11-desmethoxyreserpine
deserpidine	
desoxycortonium	21-hydroxy-3,20-dioxopregn-4-ene
desoxycortone	
dextranum	polysaccharide of high molecular weight produced by the action of
dextran	<i>Leuconostoc mesenteroides</i> on saccharose
dibrompropamidinum	1,3-bis-(4-amidino-2-bromophenoxy)propane
dibrompropamidine	
dichlorophenum	di-(5-chloro-2-hydroxyphenyl)methane
dichlorophen	
dichloroxylenolum	2,4-dichloro-3,5-dimethylphenol
dichloroxylenol	
dicycloverinum	β -diethylaminoethyl cyclohexylcyclohexanecarboxylate
dicycloverine	
diethylstilboestrolum	<i>trans</i> -3,4-bis-(4-hydroxyphenyl)hex-3-ene
diethylstilboestrol	
digoxinum	glycoside obtained from the leaves of <i>Digitalis lanata</i> Ehrh
digoxin	
dihexyverinum	2-piperidinoethyl 1-cyclohexylcyclohexanecarboxylate
dihexyverine	
dihydralazinum	1,4-dihydrazinophthalazine
dihydralazine	
dimethoxanatum	β -dimethylaminoethoxyethylphenothiazine-10-carboxylate
dimethoxanate	
dioxethedrinum	1-(3,4-dihydroxyphenyl)-2-ethylaminopropan-1-ol
dioxethedrin	
diphemanil methylsulfas	<i>N,N</i> -dimethyl-4-piperidyl-diphenylmethane methyl sulfate
diphemanil methylsulfate	
diphenylpyralinum	<i>N</i> -methylpiperidyl-4-benzhydryl ether
diphenylpyraline	
dipyrrocetylum	2,3-diacetoxybenzoic acid
dipyrrocetyl	
dycloninum	<i>p</i> -butoxy-3-piperidinopropiophenone
dyclonine	
ecothiopati iodium	S-2-dimethylaminoethyl-0,0-diethylphosphorothiolate methiodide
ecothiopate iodide	
ectylurea	2-ethyl- <i>cis</i> -crotonylurea
ectylurea	

meprobamatum	2,2-dimethyl-5-methyl-5-pentylpentane-1,3-dione
meprobamate	
meprylicanum	2-methyl-2-propylamino-1-phenylethanol
meprylicane	
mercaptopurinum	6-mercaptopurine
mercaptopurine	
mercuramidum	o-carboxyphenylglyoxylic acid amide of hydroxymercuripropanol
mercuramide	
mercuratilius natrium	sodium 8-(2-methoxy-3-hydroxymercuripropyl)coumarin-3-carboxylate
mercuratili natrium	(sodium mercuriallylate) theophylline
mesumidum	1,3-dimethyl-2,5-dioxy-3-phenylpyrrolidine
mesumide	
methallenestrum	3-(6-methoxynaphthyl)-3-ethyl-2,2-dimethylpropionic acid
methall nestil	
methionum	(±)-2-amino-4-methylthiobutyric acid
methionine	
methitalum	5-methylthioethyl 5-(2-pentylthio)barbituric acid
methitural	
methopromazinum	2-methoxy-10-(3-dimethylaminopropyl)phenothiazine
methopromazine	
methoxyphedrinum	1-p-methoxyphenyl methylamino-propan-1-one
methoxyphedrine	
methyloelluloseum	cellulose methyl ether containing about 30 percent w/w of methoxy
methyloellulose	
methylypennolum	3-methylpentyl 3-ol
methylypennol	
methylyphenidatum	phenyl-4-(2-piperidyl)methyl acetate
methylyphenidate	
methylytestosteronum	17β-hydroxy-17-methyl-3-oxoandrost-4-ene
methylytestosterone	
methylypylonum	3,3-dimethyl-5-methylpiperidine-2,4-dione
methylypylon	
monobenonum	monobenzylether of hydroquinone
monobenone	
morphidinum	morpholinoethylorpethidine
morphid	
natrium acetozon	sodium 3-acetamido-2,4,6-triodobenzoate
sodium acetozon	
natrium idotizon	sodium 3,5-diacetamido-4,6-triodobenzoate
sodium idotizon	
natrium calcedis	calcium chelate of the disodium salt of thyleddimethoxy-1,1,1,3,3,3-hexafluoro-2,4,6-triacetic acid
sodium calcedis	
natrium dioctylsulfosuccinatus	disodium 2-ethylhexyl sodium sulfosuccinate
sodium dioctylsulfosuccinat	
natrium dipotrizon	sodium 3,5-dipropionylmethyl-2,4,6-triodobenzoate
sodium dipotrizon	

R mm d d l t t t
N n-p p i t y n m
(Lal E gl h)

Ch mic I Nam D cript

hydroxystilbamidinum	1 (4-amidino 2 hydroxyphenyl) 2 (4 amidinophenyl)ethylene
hydroxystilbamidine	
hydroxyzinum	1 (p-chlorobenzhydryl)-4 [2 (2 hydroxyethoxy)ethyl]piperazine
hydroxyzine	
infectio insulini zinci globinati	a sterile buffered solution of insulin with zinc chloride and globin
globin zinc insulin injection	
infectio insulini zinci protaminati	a sterile buffered suspension of insulin with zinc chloride and protamine
protamine zinc insulin injection	
isometheptenum	2 methylamino-6-methylhept 5-ene
isometheptene	
isophanum insulinum	a sterile suspension of insulin with the isophanic equivalent of protamine and zinc chloride
isophane insulin	
isothipendylum	10-(3 dimethylaminopropyl) 9 thia-4 10-diazaanthracene
isothipendyl	
lanatosidum C	glycoside obtained from the leaves of <i>Digitalis lanata</i> Ehrh
lanatoside C	
laudexii methylsulfas	decamethylene- α - ω -bis [1 (3 4 -dimethoxybenzyl) 1 2 3 4 tetrahydro
laudexium methylsulfate	6 7 dimethoxy 2 2 dimethylisoquinolinium sulfate]
lauralkonii chloridum	2-(p laurylphenyloxy)ethylbenzylidimethylammonium chloride
lauralkonium chloride	
leucovorinum	5 formyl 5 6 7 8 tetrahydropteroylglutamic acid
leueovorin	
levomoramidum	() 3 methyl 2 2-diphenyl-4-morpholinobutylpyrrolidine
levomoramide	
levothyroxinum natrium	L β [(4 hydroxy 3 5-diiodophenoxy) 3 5 diiodophenyl] alanine sodium
levothyroxine sodium	
liothyroninum	L-4-(4-hydroxy 3 iodophenoxy) 3 5-diiodophenylalanine
liothyrontine	
lucanthonium	1 (2-diethylaminoethylamino)-4 methylthioxanthone
lucanthone	
macrogoli lauras 600	mono ester of lauric acid and polyethylene glycol 600
maerogol laurate 600	
macrogoli oleas 600	mono ester of oleic acid and polyethylene glycol 600
macrogol oleate 600	
macrogoli stearas 600	mono ester of stearic acid and polyethylene glycol 600
macrogol stearate 600	
macrogoli stearas 1000	mono ester of stearic acid and polyethylene glycol 1000
macrogol stearate 1000	
magnesi aluminium glycinas	hydroxy aluminium magnesium aminoacetate
magnesium aluminium glycinate	
mecamylaminum	3 methylaminoisobornane
mecamylamine	
melarsoprolum	2 [4-(4 6-diamino-2 s triazinylamino)-phenyl]-4-hydroxymethyl 1 3,2
melarsoprol	dithiaarsenobidine
mepacrinum	3-chloro-9-(4 -diethylamino 1 methylbutylamino)-7 methoxy acridine
mepacrine	
mephenterminum	N α α (trimethyl β -phenylethyl)amine
mephentermine	

phenacetinum	p-etho acetanil de
phenacetin	
phenazonum	2,3-dimethyl 1 phenyl 5 pyrazolo e
phenazone	
phenaglycodolum	2 p-chlorophenyl 3 methylbutane-2 3-d ol
phenaglycodol	
phenamazolum	2 anilinomethylimidazoline
phenamazoline	
phenobarb talum	5-ethyl 5 phe ylbarbituric acid
phenobarbital	
ph nobarbitalum natricum	sodium derivati e of 5-ethyl 5 phenylbarb turic acid
phenobarbital sod um	
phenobutod lum	-(2 4 6-triodophenoxy)butyric acid
phenobutodil	
phe o ybenzaminum	N phenoxisopropyl N benzyl β -chloroethylam ne
phenoxybenzamine	
phenoxymethylpenicillin m	an ant biotic in whi ch th benzyl group of penzylpenicillin has been replaced by ph noxymethyl group
phenoxymethylpenicillin	
phenylhydrargyri boras	eq molecular compound of phe ylm uric borate and phenylm uric hydroxide
phenylmercuri borate	
phensux mid m	1 methyl 3-ph nyl 2 5-d oxopyrrol dine
phensuximide	
phenylth l num	2-ethyl 2 phenylth amorpholine 3 5-dione
phenylthione	
phe yltolo aminum	2-(o-benzylph oxy)ethylid methylamine
phenyltoloxamine	
phenyto num	5 5-d phe ylhydantoin
phe yto	
phthalysulf methizolum	5 phthalysulfan lam do- methyl 1 3 4-thiadazole
phthalysulfamethizole	
pimetremid m	N methyl N-(β -p colyl)tropan de
pimetremide	
p penzolat brom d m	1-ethyl 3 p peridyl benzil te methyl b omide
pipenzolate bromide	
p peraz n calc edetas	chelate produced by reacting edetic acid with calcium carbonate and p perazin
p peraz n calc m edetate	
piperidolat m	N-ethylp erid 3-yl d phenylacetate
p pipendolate	
p prad olum	-d phe yli- α piperid 2 ylmetha ol
p pradrol	
polymyx num B	an tib ot c s bstance obt ned from cult res of <i>Bac ill p lym xa</i>
p lymyxin B	o the same substance produced by any othe means
pramocinum	1-[3-(4-morpholinol)propoxy]-4-butoxybenze e
pramocaine	
pred solonum	11 β 17 21 trihydro ypregn 1 4-d ene 3 0-d ne
prednisolon	
pred son m	17 21-d hydroxypregn 1 4-d ene-3 11,20-trione
pred sone	

R c m d d l i t t l
N P p t y h m
(L t E g l sh)

Ch m f \ m D ipi

sodium radiochromas (^{51}Cr)
sodium radiochromate (^{51}Cr)
sodium radiophosphas (^3P)
sodium radiophosphate (^3P)
neoarsphenaminum
neoarsphenamine
nicethamidum
niketamide
nicotinamidum
nicotinamide
nidroxyzonum
nidroxyzone
nitricholinii perchloras
nitricholinium perchlorate
norethandrolonum
norethandrolone
novobiocinum
novobiocin
nystatinum
nystatin
oestradioli benzoas
oestradiol benzoate
oestradiolum
oestradiol
oestronum
oestrone
oleandomycinum
oleandomycin
ostreogrycinum
ostreogrycin
oxeladinum
oxeladin
pamaquinum
pamaquin
pentacynii chloridum
pentacynium chloride
pentaquinum
pentaquin
pentetrazolum
pentetrazol
pentolonium
pentolonium
pentoxyvernum
pentoxyverine
petrichloralum
petrichloral

anionic hexavalent radioactive chromium (^{51}Cr) in the form of sodium chromate
radioactive phosphorus in the form of a mixture of sodium dihydrogen phosphate and disodium hydrogen phosphate
sodium 3,3-diamino-4,4-dihydroxyarsenobenzene- Λ -methylenesulfoxylate
pyridine 3-carboxylic acid diethylamide
pyridine 3-carboxylic acid amide
5 nitro 2 furaldehyde 2 (2 hydroxyethyl)semicarbazone
2 hydroxyethyltrimethylammonium nitric acid ester perchlorate
17-ethyl 17 β -hydroxy 3-oxoestr-4-ene
an antibiotic substance obtained from cultures of *Streptomyces spiralis* or the same substance produced by any other means
an antibiotic substance obtained from cultures of *Streptomyces rosei* or the same substance produced by any other means
3-benzoyloxy 17 β -hydroxyoestra 1,3,5(10)-triene
3,17 β -dihydroxyoestra 1,3,5(10)-triene
3-hydroxy 17-oxoestra 1,3,5(10)-triene
an antibiotic substance obtained from cultures of *Streptomyces antibioticus* or the same substance produced by any other means
an antibiotic substance obtained from cultures of *Streptomyces streptogriseus* or the same substance produced by any other means
2-(2-diethylaminoethoxy)ethyl-ethyl- α -phenylbutyrate
6-methoxy 8-(4-diethylamino-1-methylbutylamino) quinoline alt. cl. 2,2-dihydroxy 1,1-dinaphthylmethane 3,3-dicarboxylic acid
 Λ [Λ -(5-cyano 5,5-diphenylpentyl) *N*-dimethylammoniummethyl] Λ -methylmorpholinium dichloride
8-(5-isopropylamino-pentylamino) 6-methoxyquinoline
pentamethylene 1,5-tetrazole
1,5-(1,1-dimethyl-1,1-dipyrrolidyl)pentane
2-(2-diethylaminoethoxy)ethyl 1-phenyl-cyclopentane 1-carboxylate
pentaerythritol chloral

sorbimacrogoli oleas 300	mono ester of oleic acid and tripolyethyleneglycol 300 sorbitan ether
sorbimacrogol oleate 300	
spiramycinum	an antibiotic substance obtained from cultures of <i>Spirito myc s ambo-</i>
spiramycin	<i>faciens</i> or the same substance produced by any other means
stilbamidini isethionas	1,2-bis-(4-aminophenyl)-ethylene di-(2-hydroxyethane)-sulfonate
stilbamidine isethionate	
streptodornasum	enzyme obtained from cultures of various strains of <i>Streptococcus</i>
streptodornase	<i>hemolyticus</i> and capable of hydrolysing desoxyribonucleoproteins
streptokinasum	co-enzyme obtained from cultures of various strains of <i>Streptococcus</i>
streptokinase	<i>hemolyticus</i> and capable of changing plasminogen into plasmin
streptovarycinum	an antibiotic substance composed of several related components
streptovarycin	obtained from cultures of <i>Spirito myc s variabilis</i>
succinylsulfathiazolum	2-(N-(3-carboxypropionyl)sulfanilamido)thiazol
succinylsulfathiazole	
sulfadiazinum	2-sulfanilamidopyrimidine
sulfadiazine	
sulfadiazinum natricum	sodium derivative of 2-sulfanilamidopyrimidine
sulfadiazine sodium	
sulfadicromidum	N-(3,3-dimethylacryl)sulfanilamide
sulfadicroside	
sulfaguanidinum	N-amidinosulfanilamide
sulfaguanidine	
sulfamerazinum	2-sulfanilamido-4-methylpyrimidine
sulfamerazine	
sulfamerazinum natricum	sodium derivative of 2-sulfanilamido-4-methylpyrimidine
sulfamerazine sodium	
sulfanilamidum	4-aminophenylsulfonamide
sulfanilamide	
sulfaproxylum	N ¹ -(4-isopropoxybenzoyl)sulfanilamide
sulfaproxylene	
sulfarsphenaminum	disodium 3,3'-diamino-4,4'-dihydroarsenobenzene N,N'-bismethylenebisulfite
sulfarsphenamine	
sulfathiazolum	2-sulfanilamidothiazole
sulfathiazole	
suspensio insulini cum zinco	sterile buffered mixture of insulin zinc suspension (amorphous)
(composita)	(30 per cent) and insulin zinc suspension (crystalline) (70 per cent)
insulin zinc suspension (compound)	
suspensio insulini cum zinco	a sterile buffered suspension of the amorphous form of insulin with
(amorphum)	zinc chloride
insulin zinc suspension (amorphous)	
suspensio insulini cum zinco	a sterile buffered suspension of the crystalline form of insulin with
(crystallizati)	zinc chloride
insulin zinc suspension (crystalline)	
testosteronum	17 β -hydroxy-3-oxoandrost-4-ene
testosterone	
tetrabarbitalum	5-ethyl-5-(1-ethylbutyl)barbituric acid
tetrabarbital	

probenecidum	<i>p</i> (di <i>n</i> propylsulfamoyl)benzoic acid
probenecid	
prochlorperazinum	1 [3 (2-chloro 10-phenothiazinyl)propyl]-4-methylpiperazine
prochlorperazine	
prodeconu bromidum	<i>N N N N</i> tetramethyl <i>N N</i> bis (carbopropoxymethyl) 2 13-dioxatetradecane 1 14-diammonium dibromide
prodeconum bromide	
progesteronum	3 20-dioxopregn-4-ene
progesterone	
proguanilum	<i>N</i> ¹ -4-chlorophenyl <i>N</i> ⁴ isopropylidiguanide
proguanil	
promoxolanum	2 2 diisopropyl-4 hydroxymethyl 1 3 dioxolane
promoxolane	
propanocainum	3 diethylamino 1 phenylpropyl benzoate
propanocaine	
propazolamidum	2 propionamido 1 3 4 thiadiazole 5 sulfonamide
propazolamide	
propoxycainum	2 diethylaminooctyl 4 amino 2 propoxybenzoate
propoxycaine	
propylhexedrinum	1-cyclohexyl 2 methylaminopropane
propylhexedrine	
prothipendylum	10-(3-dimethylaminopropyl) 9 thia-4 10-diazaanthracene
prothipendyl	
proxymetacainum	β -diethylaminoethyl 3 amino-4 propoxybenzoate
proxymetacaine	
pyridostigminum	dimethylcarbamie ester of 1 methyl 3 hydroxypyridine
pyridostigmin	
pyrvinii chloridum	6-dimethylamino 2 [2 (2 5 dimethyl 1 phenyl 3 pyrrol)vinyl] 1 methyl quinolinium chloride
pyrvinium chloride	
quisinocainum	1 (2 dimethylaminoethoxy) 3 butylisoquinoline
quisinocaine	
racemoramidum	(\pm) 3 methyl 2 2 diphenyl-4-morpholinobutyrylpyrrolidine
racemoramide	
rescinannum	methyl 1 α 2 β 3 α 4 4 α 5 7 8 13 13 β 14 14 α dodecahydro-2 11-dimethoxy 3 β -(3 4 5 trimethoxycinnamoyloxy) benzo[<i>g</i>]indolo[2 3 - <i>q</i>]quinoline 1 β -carboxylate
rescinannone	or 3 4 5 trimethoxycinnamic acid ester of methyl reserpate
	methyl 1 2 β 3 α 4 4 α 5 7 8 13 13 β 14 14 α dodecahydro-2 α 11-dimethoxy 3 β (3 4 5 trimethoxybenzoyloxy) benzo[<i>g</i>]indolo[2 3 - <i>a</i>]quinoline 1 β -carboxylate
	or 3 4 5 trimethoxybenzoic acid ester of methyl reserpate
reserpinum	6 7-dimethyl 9 (D 1 ribityl)isoalloxazine
reserpine	
	5 allyl 5 (1 methylbutyl)barbituric acid
riboflavinum	mono ester of oleic acid and tripolyethyleneglycol 100 sorbitan ether
riboflavine	
secobarbitalum	
secobarbital	
sorbimacrogoli oleas 100	
sorbimacrogol oleate 100	

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tetracainum	2 dimethylaminoethyl 4 butylaminobenzoate
tetracaine	
tetracyclinum	4-dimethylamino-1 4 4a 5 5a 6 11 12a-octahydro-3 6 10 12 12a penta
tetracycline	hydroxy 6-methyl 1 11-dioxonaphthacene 2-carboxamide
tetryzolinum	2 (1 2 3 4 tetrahydronaphth 1 yl) 2 imidazoline
tetryzoline	
thenalidinum	1 methyl-4-[N (2 thenyl)anilino]piperidine
thenalidine	
thialbarbitalum	5 allyl 5 (2-cyclohexenyl) 2 thiobarbituric acid
thialbarbital	
thiopentalum natricum	monosodium derivative of 5 (1 methylbutyl) 5-ethyl 2 thiobarbituric
thiopental sodium	acid
thiotetrabarbitalum	5 (1-ethylbutyl) 5-ethyl 2 thiobarbituric acid
thiotetrabarbital	
tolbutamidum	N p-tolylsulfonyl N n butylcarbamide
tolbutamide	
tolonium chloridum	3 amino 7-dimethylamino 2 methylphenazathionium chloride
tolonium chloride	
tosylchloramidum natricum	sodium toluene-4 sulfonylchloramide
tosylchloramide sodium	
tretaminum	2 4 6-tri (ethyleneimino) s triazine
tretamine	
tolproninum	1 (1 2 3 6 tetrahydropyridino) 3-o-tolylloxypropan 2-ol
tolpronine	
tricyclamol chloridum	(+) 1 (3-cyclohexyl 3 hydroxy 3 phenylpropyl) 1 methylpyrrolidinium
tricyclamol chloride	chloride
tridihexethyl chloridum	3-diethylamino-1 phenyl 1-cyclohexyl 1 propanol ethochloride
tridihexethyl chloride	
trimeperidinum	1,2 5 trimethyl-4-phenyl-4 propionoxypiperidine
trim peridine	
trimetaphan camphorsulfonas	(+)-4 6-dibenzyl 5-oxo-1 thia-4 6-diazatricyclo [6 3 0 0 ³ 1]
trimetaphan camphorsulfonate	undecanum (+)-camphorsulfonate
triprolidinum	trans 1 (pyrid 2 yl) 3 pyrrolidino-1 p-tolylprop-1-ene
triprolidine	
tryparsamidum	sodium N phenylglycylamide-4 arsonate
tryparsamide	
vancomycinum	an antibiotic substance obtained from cultures of <i>Streptomyces orien</i>
vancomycin	salis or the same substance produced by any other means
verazidum	1 isonicotinoyl 2 veratrylidene hydrazine
verazide	
zoxazolaminum	2 amino-5-chlorobenzoxazole
zoxazolamine	

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